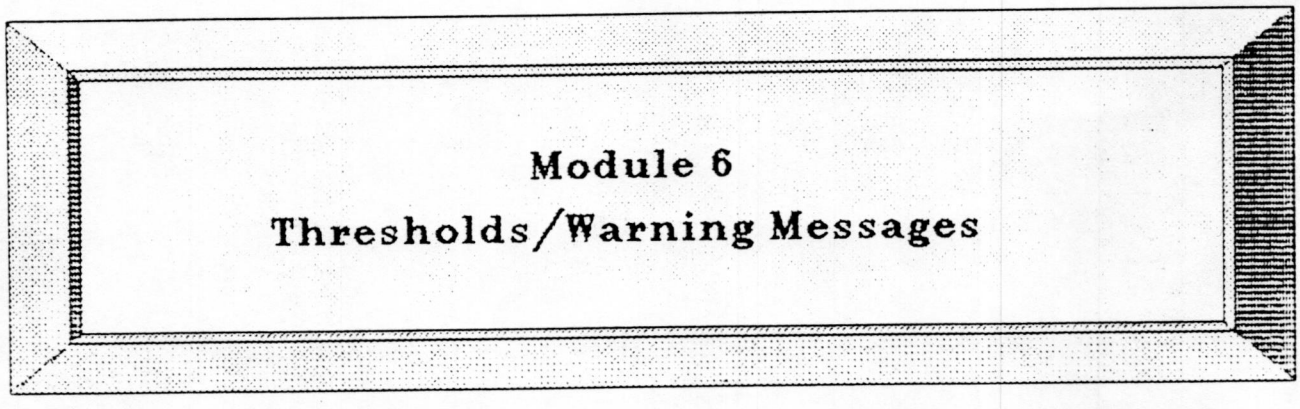

Module 6
Thresholds/Warning Messages

MODULE SIX
THRESHOLDS/WARNING MESSAGES

This module has two parts.

PART ONE OVERVIEW :

For many customers it is advantageous to know when certain operational parameters or levels have been exceeded. The thresholding capability of the Meridian SL-1 allows customers to set the desired levels so that the printouts only occur when the desired levels have been reached. In part 1 of this module you'll learn about.

1. Threshold level querying.
2. Threshold level setting.
3. Threshold Violation Outputs (the printed message).

PART ONE OBJECTIVE:

Given three threshold violation outputs and a copy of the NTP Section 450 determine with eighty percent accuracy:

What caused the threshold violation.

PART TWO OVERVIEW:

In this part of the module you are going to learn about the importance of warning messages, and why they appear on printouts.

PART TWO OBJECTIVE:

Given two warning messages you will be required to identify the following with 80 percent accuracy:

What the warning messages indicate.

Thresholds in the Meridian SL-1 are a means of telling the system you want to be notified if a certain event occurs. In most cases the event will be when a certain operational parameter is reached.

For example, you can request that the system print a threshold violation output when:

- A certain percent of all trunks are busy.

- Loop traffic exceeds a certain CCS value within a predefined time period.

When a preset threshold level has been exceeded, the Meridian SL-1 will output one or more traffic data blocks associated with the particular threshold. This data may then be examined for further insight into the cause of the problem. These traffic options will be output regardless of whether the option has been specifically scheduled, as long as an "active" schedule is maintained for either system or customer traffic or both. Under these conditions, however, there is no way to suppress the printing of these options when any one system or customer threshold is violated.

Threshold violation outputs are useful in two ways. For the customer who desires to run all traffic options year-round, they serve as flags (when set to some value) over and above the traffic data, which can be clarified by the associated traffic options. For the customer who does not want to see traffic information (unless there is a problem), they can serve as a means to suppress traffic printouts when the system is operating within the limits set by the thresholds. In this case, no options should be scheduled, but threshold values set and an "active" schedule maintained (for example, Jan. 1 - Dec. 31).

Threshold reports and any warning messages will be printed immediately after the time and date stamp and before all other reports on a printout. If you understand everything up to this point continue to the practice exercise.

*** PRACTICE EXERCISE ***

1. What is a threshold?

2. List two ways in which threshold violation outputs are useful.

*** ANSWER ***

1. What is a threshold?

   A means of telling the system you want to be notified if a certain operational parameter is reached.

2. List two ways in which threshold violation outputs are useful.

   1. They serve as flags over and above the traffic data.

   2. They can serve as a means to suppress traffic printouts when the system is operating within the limits set by the thresholds.

If you had any problems with this exercise it is recommended that you review before continuing.

The two categories of thresholds are:

System Threshold Levels

- TFS1Ø1 DIAL TONE SPEED
- TFS1Ø2 LOOP TRAFFIC
- TFS1Ø5 JUNCTOR TRAFFIC

Customer Threshold Levels

- TFC1Ø1 INCOMING MATCHING LOSS
- TFC1Ø2 OUTGOING MATCHING LOSS
- TFC1Ø3 AVERAGE SPEED OF ANSWER
- TFC1Ø4 PERCENT ALL TRUNKS BUSY
- TFN1Ø1 OHQ OVERFLOW

*** PRACTICE EXERCISE ***

1. List the numbers of the system level thresholds.

2. List the numbers of the customer level thresholds.

*** ANSWER ***

1. List the numbers of the system level thresholds.

   TFS1Ø1, TFS1Ø2, TFS1Ø5

   NOTE: The letter 'S' indicating a system threshold.

2. List the number of the customer level thresholds.

   TFC1Ø1, TFC1Ø2, TFC1Ø3, TFC1Ø4

   NOTE: The letters "C"and "N" are used for customer thresholds.

If you had a problem with this exercise it is recommended that you review before continuing.

The outputs that we will be reviewing are given only when threshold levels are exceeded. Not setting a threshold is equivalent to setting it to zero and will result in an exception report.

Turn to page 6-1 in the NTP and read sections 6.Ø2 through 6.Ø4 on the TFS1Ø1 dial tone speed threshold.

*** RETURN HERE WHEN YOU HAVE FINISHED READING ABOUT TFS1Ø1. ***

If you understand everything that you have read continue on to the practice exercise.

*** PRACTICE EXERCISE ***

Use the information below to answer the questions that follow. The following report was printed because the threshold was exceeded.

```
2ØØ  TFS1Ø1
 ØØØ19   ØØØ14
```

1. What is the threshold setting in this report? _____.

2. What is the percent dial tone delay? _____.

*** ANSWER ***

1. What is the threshold in this report? 1.4%

2. What is the percent dial tone delay? 1.9%

As you can see the dial tone delay exceeded the threshold by .5% causing the report to be printed. If you had any problems with this exercise it is recommended that you review before continuing.

Now that you have taken a look at the TFS101 dial tone speed threshold report turn to page 6-1 Section 6.05-6.07 in the NTP and read about the TFS102 loop traffic threshold.

*** RETURN HERE WHEN YOU HAVE FINISHED READING ABOUT TFS102. ***

If you understand everything that you read continue on to the practice exercise.

*** PRACTICE EXERCISE ***

Use the information below to answer the questions that follow.

The following report was printed because the threshold was exceeded.

```
220  TFS102
02   0000600   00550
```

1. What is the loop usage in this report? _____

2. What is the threshold for this report? _____

3. What loop exceeded the threshold? _____

*** ANSWER ***

1. What is the loop usage in this report? 600 CCS

2. What is the threshold for this report? 550 CCS

3. What loop exceeded the threshold? Loop 2

As you can see the loop usage exceeded the threshold by 50 CCS causing the report to be printed.

The next threshold that you will be reviewing is the last of the system thresholds. Turn to page 6-1 Sections 6.08-6.10 in the NTP and read about the TFS105 Junctor Traffic Threshold.

*** RETUN HERE WHEN YOU HAVE FINISHED READING ABOUT TFS105. ***

If you understand everything that you have read continue on to the practice exercise.

*** PRACTICE EXERCISE ***

Use the information below to answer the questions that follow.

The following report was printed because the threshold was exceeded.

```
220   TFS105
12    0002138   0002000
```

1. When the junctor traffic threshold is exceeded what system report is also printed? _____

2. What is the threshold for this report? _____

3. What is the junctor usage for this report? _____

4. What junctor group exceeded the threshold? _____

*** ANSWER ***

1. When the junctor traffic threshold is exceeded what system report is also printed? TFSØØ7

2. What is the threshold for this report? 2ØØØ CCS

3. What is the junctor usage for this report? 2138 CCS

4. What junctor group exceeded the threshold? 12

As you can see the junctor usage CCS exceeded the threshold by 138 CCS causing the report to be printed.

If you had any problems with this exercise it is recommended that you review before continuing.

Now that you have reviewed all of the system threshold format(s), you will review the customer thresholds.

Turn to page 6-2 in the NTP and read Sections 6.11-6.13 on the TFC1Ø1 Incoming Matching Loss Threshold.

*** RETURN HERE WHEN YOU HAVE FINISHED READING ABOUT TFC1Ø1. ***

If you understand everything that you have read continue on to the practice exercise.

*** PRACTICE EXERCISE ***

Use the information below to answer the questions that follow.

The following report was printed because the threshold was exceeded.

```
2ØØ   TFC1Ø1
Ø1
 ØØØØ3    ØØØØØ
```

1. What is the threshold set at in this report? _____

2. What is the incoming matching loss? _____

*** ANSWER ***

1. What is the threshold set at in this report? Ø.8

2. What is the incoming matching loss? Ø.3%

As you can see the incoming matching loss exceeded the threshold by Ø.3% causing the report to be printed.

If you had any problems with this exercise it is recommended that you review before continuing.

Turn to page 6-2 in the NTP and read Sections 6.14-6.16 on the TFC1Ø2 Outgoing Matching Loss.

*** RETURN HERE WHEN YOU HAVE FINISHED READING ABOUT TFC1Ø2. ***

If you understand everything that you have read continue on to the practice exercise.

*** PRACTICE EXERCISE ***

Use the information below to answer the questions that follow.
The following report was printed because the threshold was exceeded.

```
2ØØ   TFC1Ø2
 Ø2
 ØØØ2Ø     ØØØ15
```

1. What is the threshold set at in the report? _____

2. What is the outgoing matching loss? _____

*** ANSWER ***

1. What is the threshold set at in the report? 1.5%

2. What is the outgoing matching loss? 2.0%

As you can see the outgoing matching loss exceeded the threshold by Ø.5% causing the report to be printed.

If you had any problems with this exercise it is recommended that you review before continuing.

Turn to page 6-3 in the NTP and read Sections 6.17-6.19 on the TFCIØ3 Average Speed of Answer.

*** RETURN HERE WHEN YOU HAVE FINISHED READING ABOUT TFCIØ3. ***

If you understand everything that you have read continue to the practice exercise.

*** PRACTICE EXERCISE ***

Use the information below to answer the questions that follow. The following report was printed because the threshold was exceeded.

```
200    TFC103
 00
 00152     00120
```

1. What is the threshold set at in the report? _____

2. What is the average speed of answer? _____

*** ANSWER ***

1. What is the threshold set at in the report? 12.Ø seconds

2. What is the average speed of answer? 15.2 seconds

As you can see the average speed of answer exceeded the threshold by 3.2 seconds, causing the report to be printed.

If you had any problems with this exercise is is recommended that you review before continuing.

Turn to page 6-3 in the NTP and read Section 6.2Ø-6.22 on the TFC1Ø4 Percent All Trunks Busy.

*** RETURN HERE WHEN YOU HAVE FINISHED READING ABOUT TFC1Ø4 ***

If you understand everything that you read, continue on to the practice exercise.

*** PRACTICE EXERCISE ***

Use the information to answer the questions.
The following report was printed because the threshold was exceeded.

```
200    TFC104
Ø2
Ø4
 ØØØ18     ØØØ15
```

1. What is the threshold set at in the report? _____

2. What is the percent of trunks busy? _____

*** ANSWER ***

1. What is the threshold set at in the report? 1.5%

2. What is the percent of trunks busy? 1.8%

As you can see the percent of trunks busy exceeded the threshold by Ø.3% causing the report to be printed.

Another customer threshold is TFNIØI even though it is identified "TFN".

EXAMPLE:

Ø855 TFNIØI

ØØØ
OHQT ØØ387 ØØØØØ

Ø855 is the system ID.

ØØØ is the customer number.

ØØ387 is the percentage (expressed in units of Ø.1%) of off-hook queue calls which timed out (overflowed) in the OHQ before an available trunk was found. This value represents the total number of OHQ overflows, divided by the total number of OHQ offers plus the OHQ overflows.

ØØØØØ is the threshold.

The OHQ overflow threshold measurement (TFNIØI) provides an indication that more than the expected number of users are timing out in the OHQ. This means that OHQ is offered and accepted, but a trunk does not become available before the service-changeable OHQ time limit expires. This could result from trunks being out of service, an incorrectly defined OHQ time limit, or temporary traffic overload.

Now that you have reviewed the threshold reports and their meaning you need to review the format of the input commands to set and query these reports.

Begin by reviewing module three in this text (REPORT SCHEDULING AND OPTIONS) and Section 8 (COMMUNICATING WITH THE SYSTEM) in the NTP in the Appendix. Since the communication process is the same only the areas that differ will be reviewed.

Remember you must be in overlay program (2) when communicating with the system.

The command "TTHS" is used to query system threshold levels, followed by the threshold code.

Example format for Query System Threshold Level:

Format: TTHS (TC) (tv)

Actual Input: TTHS 1 Ø15

The TTH S is entered by the user to indicate that it is a System threshold query.

The letters "TC" stand for Threshold Code. Turn to page 8-6 in the NTP and read Table 8A System T hreshold C odes

*** RETURN HERE WHEN YOU HAVE FINISHED READING. ***

One of the three system t hreshold c odes is entered in the 'TC' column depending on what measurement you desire. YOU DO NOT ENTER THE LETTERS "TC" . The letters 'TC' stand for t hreshold c ode.

The letters 'tv' stand for t hreshold v alue.
This is the actual value (Range on chart) of the threshold being queried.

*** PRACTICE EXERCISE ***

1. What command would you enter if you desired to query a system threshold? _____

2. The letters 'TC' indicate what?

3. List the system threshold codes and what they measure.

4. What do the letters "tv" indicate in the system threshold query format?

*** ANSWER ***

1. What command would you enter if you desired to query a system threshold? TTHS

2. The letters 'TC' indicate what? t hreshold c ode

3. List the system threshold codes and what they measure? 1 Dial tone speed, 2 loop traffic, 3 junctor group traffic

4. What do the letters "tv" indicate in the system threshold query format?

   The actual value (RANGE) of the threshold being queried .

This concludes the review of the system threshold query format. The next topic you will review will be the format for setting system thresholds. Any of the thresholds may be set at whatever level is desired by the customer.

The command "STHS" is used to set system threshold levels, followed by the threshold code.

Example:

Format: STHS (TC) (tv) -- (TV)

Actual Input: STHS 1 Ø2Ø -- Ø15

You may have noticed already that most of the input for querying thresholds is identical to setting them. Only the differences in querying and setting the thresholds will be reviewed.

The threshold codes and values are the same as those used to Query the threshold (NTP page 8-6).

The large letters (TV) in the example below illustrate where you would enter the new threshold value that you want based on your particular grade of service expected. (See table 8-A page 8-6 in the NTP for codes and range of values.) The small letters (tv) illustrate the current threshold values output by the system.

STHS(TC)(tv) - - (TV) Example Input: STHS 1 Ø2Ø - - Ø15

The 1 is the threshold code, dial tone speed.
The Ø2Ø is the present threshold value.
The Ø15 is the new threshold value set.

*** PRACTICE EXERCISE ***

Use the example threshold to answer the questions that follow:

```
.STHS 2 060 -- 100
.
```

1. What is the name of the threshold measurement being set?

2. What is the new threshold value?

*** ANSWER ***

1. What is the name of the threshold measurement being set?

   LOOP TRAFFIC

2. What is the new threshold value?

   100 CCS

Although most thresholds may be set to any desired level, many thresholds have a recommended setting, which reflects the Northern Telecom grade of service. A list of such settings for the majority of systems is provided below:

THRESHOLD	RECOMMENDED SETTING	RECOMMENDED GRADE OF SERVICE MAXIMUM
TFS101-Dial Tone Speed	015	1.5%
TFS102-Loop CCS	550	660 CCS
TFS105-Junctors	1000 CCS	2000 CCS

*** PRACTICE EXERCISE ***

1. What is the recommended setting for threshold code number 2? _____

2. What is the recommended setting for threshold code number 5? _____

3. What is the recommended setting for threshold code number 1? _____

*** ANSWER ***

1. What is the recommended setting for threshold code number 2? 550

2. What is the recommended setting for threshold code number 5? 1000

3. What is the recommended setting for threshold code number 1? 015

Continue on to the next topic if you didn't have any problems with this exercise.

This concludes the review of input format command for system threshold query and system threshold setting.

The next review will cover the input format commands for customer threshold query and setting customer thresholds.

Most of the input formats will be primarily the same for both the system and the customer; therefore, the review will only go into detail on the difference of the two.

Begin by taking a look at the format used for a customer threshold query.

The command "TTHC" is used to queue customer threshold levels, followed by the customer number and the threshold code.

Example format for Query System Threshold Level:

Format: TTHC(Customer)(TC)(tv)

Actual Input: TTHC Ø 2 Ø1Ø

Note: When entering the customer number, press the space bar instead of a carriage return after the customer number. Pressing the carriage return key will result in an error code.

The TTH C command is entered by the user to indicate that it is a customer threshold query.

The "CUSTOMER" number is entered by the user to indicate to the system which customer is going to be queried.

The letters "TC" stand for Threshold Code. Turn to page 8-7 in the NTP and read Table 8-B Customer Thresholds.

RETURN HERE WHEN YOU HAVE FINISHED READING.

One of the five customer threshold codes are entered in the "TC" column depending on what measurement you desire.

The letters "tv" stand for threshold value. This is the actual value (Range on the chart page 8-7 table 8-B) of the threshold being queried.

*** PRACTICE EXERCISE ***

1. What command would you enter if you desired to query a c ustomer threshold? _____

2. List the customer threshold codes and what they measure.

*** ANSWER ***

1. What command would you enter if you desired to query a c ustomer threshold? TTHC

2. List the customer threshold codes and what they measure.

1 Incoming Matching Loss

2 Outgoing Matching Loss

3 Average Speed of Answer

4 Percent All Trunks Busy

5 Percent OHQ Overflow

This concludes the review of the customer threshold query format. The next topic will be the format for setting customer thresholds. The review will only include those areas that differ from the previous review of setting and querying thresholds.

The command "STHC" is used to set customer threshold levels, followed by the customer number and the threshold code.

Example setting a customer threshold:

Format: STHC (customer)(TC)(tv) -- (TV)

Actual Input: STHC Ø 2 Ø1Ø -- 12

Note: Enter a space after the customer number, instead of a carriage return.

You may have already noticed that most of the input for querying threshold is identical to setting them. Only the difference between querying and setting thresholds will be reviewed.

The customer number indicates which customer is being queried.

The threshold codes and values are the same as those used to Query a customer threshold. (NTP page 8-7).

STHC(Customer) (TC)(tv) -- (TV)

Example Input: STHC Ø 2 Ø1Ø -- 12

The Ø is the customer number
The 2 is the t hreshold c ode, outgoing matching loss
The 1Ø is the present t hreshold v alue
The 12 is the new T hreshold V alue set

*** PRACTICE EXERCISE ***

Use the example threshold to answer the questions that follow:

.STHC 3 4 Ø15 -- 5Ø

1. What is the name of the threshold measurement being set?

2. What is the new threshold value?

*** ANSWER ***

1. What is the name of the threshold measurement being set?

   Percent All Trunks Busy

2. What is the new threshold value?

   5%

Like system thresholds, customer thresholds may be set to any desired level.
A list of recommended settings for the majority of systems is provided below:

THRESHOLD	RECOMMENDED SETTING	RECOMMENDED GRADE OF SERVICE MAXIMUM
TFC101-Incoming Match Loss	010	1%
TFC102-Outgoing Match Loss	010	1%
TFC103-Attendant Speed of Answer	120	12 secs.
TFC104-Percent of Calls Seizing Last Trunk	050	5%

If you have reviewed the chart continue on to the practice exercise.

*** PRACTICE EXERCISE ***

1. What is the recommended setting for threshold code number 1?
   _____

2. What is the recommended setting for threshold code number 2?
   _____

3. What is the recommended setting for threshold code number 3?
   _____

4. What is the recommended setting for threshold code number 4?
   _____

*** ANSWER ***

1. What is the recommended setting for threshold code number 1?
   Ø1Ø

2. What is the recommended setting for threshold code number 2?
   Ø1Ø

3. What is the recommended setting for threshold code number 3?
   12Ø

4. What is the recommended setting for threshold code number 4?
   Ø5Ø

System & customer threshold tests may also be performed manually at any time between outputs. The command used is an "I" command similar to that used to invoke traffic data manually. When this command is used, the Meridian SL-1 tests the data in the holding registers against the current system or customer threshold setting. If the traffic data passes the test (i.e, does not exceed the threshold setting), the system outputs the response "OK". If the traffic data exceeds the current threshold setting, the threshold violation in the format described above is output, along with the associated system or customer traffic options. (See NTP page 8-11, paragraphs 8.45 thru 8.47)

The command used to invoke system threshold tests is "ITHS", followed by the threshold code or codes desired.

Example of system threshold tests:

.ITHS 1 2

This test is for system threshold codes 1 and 2. The appropriate response would then be output by the system.

The command used to invoke customer threshold tests is "ITHC", followed by the customer number and threshold code or codes desired.

Example of customer threshold tests:

.ITHC Ø 1 3 5

This test is for customer number Ø, and customer threshold codes 1,3, and 5. The appropriate responses would then be output by the system.

SUMMARY THRESHOLDS:

- A threshold is a means of telling the system you want to be notified if a certain operational parameter is reached.
- Two categories of thresholds: Customer and System
- System thresholds include: Dial tone speed, loop traffic, and junctor traffic.
- Customer thresholds include: Incoming matching loss, outgoing matching loss, average speed of answer, percent all trunks busy, and percent off-hook queue overflow.
- Not setting a threshold is equivalent to setting it to zero.
- To find a threshold setting you could just query it.
- To change the actual threshold value you would set it.
- Threshold reports will be printed before any other traffic data.
- Threshold formats can be found in the NTP page 8-7.
- Threshold tests may be invoked manually between outputs.

This concludes the review on thresholds. For additional threshold information see pages 8-6 through 8-7 in the NTP.

In the second part of this module you will review warning messages, what the warning messages mean, and where they will be printed on the traffic reports.

What are warning messages? Well, they are just like any warning that you receive. They tell you to use caution in whatever you are doing. In this case you need to use caution in how you interpret the data on the traffic reports.

As you learned earlier, the Meridian SL-1 gathers data over a specified time period. You control this period by requesting the reports to be printed at certain times. However, while the system is gathering the data for you lots of things can happen, and probably will, this may cause the data to be corrupted one way or the other. The warning messages are intended to inform you about the corruption of data due to such things as; initialization, system reload, and a change to the traffic schedule. One or more warning messages may be output preceding the traffic measurement data.

Continue on to the practice exercise if you understand what has just been reviewed.

*** PRACTICE EXERCISE ***

1. For what are the warning messages intended?

*** ANSWER ***

1. For what are the warning messages intended?

   Inform you about corruption of report data .

Turn to page 2-5 in the NTP and read Sections 2.29, 2.30, and 2.31 on warning messages.

*** RETURN HERE WHEN YOU HAVE FINISHED READING ***

The TFS301 message indicates that an initialization has occurred at some time since the last traffic report. When this happens, the data in the accumulating registers is lost and the registers begin accumulating again from zero. Therefore, the data in the next traffic report will represent only a portion of the scheduled time interval with the results abnormally low. All data in the report will be affected, even though some may appear normal, and should be disregarded. If no more initializations occur, the data in the following hour will be valid.

* PRACTICE EXERCISE *

Use the NTP to answer this question.

1. What does the TFS301 warning message indicate?

* ANSWER *

1. What does the TFS301 warning message indicate?

This message warns that data has been corrupted by an initialization and should be ignored .

The following is an example of how and where this message may appear on a traffic report:

```
036 TFS000
25  11   1979
21  00   00

TFS301
```

The TFS3Ø2 message is significant when changes are made as to what options are to be printed. Because the accumulating registers for a particular traffic option do not re-zero themselves until that option is scheduled to be output, scheduling the printout of an option which was not output in the last traffic report will result in much larger numbers for that option in the first report after the change was made than would normally occur. Therefore, the data for that option only in that hour must be disregarded. Note that all other options in that hour's report would, however, be valid (assuming they had all been output in the previous report).

Schedule changes that involve when the data is to be printed may have a similar effect, but those are generally covered under the TFS3Ø3 message.

*** PRACTICE EXERCISE ***

Use the NTP to answer the question.

1. What does the TFS3Ø2 warning message indicate?

*** ANSWER ***

1. What does the TFS3Ø2 warning message indicate?

   This message warns that the traffic schedule was changed during the interval covered by the traffic measurement data, you may need to disregard this particular traffic data.

The following is an example of how and where this message may appear on a traffic report:

```
279  TFSØØØ
13  Ø8    1984
14  ØØ    Ø3

TFS3Ø2
```

The TFS303 message is similar to the TFS302 message in that the data following this message normally shows much larger numbers than would normally occur. However, all traffic options are affected. In defining what this message means, always remember that traffic reports are output at the end of a reporting period. However, the traffic schedule for accumulating reports must be scheduled for the beginning of the desired report period, in order to empty the holding registers and the accumulating registers, and re-zero the accumulating registers. (Note that all events take place simultaneously; that is, the holding registers are emptied of the last scheduled hour's data, at the same time that the data in the accumulating registers, and the accumulating registers are re-zeroed. The data from the accumulating registers is also output to the traffic TTY at the time of transfer to the holding registers, according to the traffic schedule). Therefore, in order to obtain valid data for an 8 - 5 study, the schedule must begin at 8:00 and end at 5:00. The first report for such a schedule would be output at 8:00, however, the first valid report will be output at 9:00. The 8:00 report will show the message TFS303, and will represent all traffic data that was accumulated between the last hour that traffic was scheduled to be output in the previous calendar day i.e, 5:00 -- and the first hour that traffic was scheduled to be output the next calendar day - i.e, 8:00. This data is invalid, as it represents 15 hours accumulation. (Note: In the above example, the data in the holding registers i.e, the 5:00 data will not change until 8:00 the next day. Therefore, it may be invoked any time before 8:00 A.M. and will represent valid 5:00 data from the previous day).

The significance of the above is that any change in when the traffic data is to be output may result in the TFS303 message appearing in the first report output after the change. Such changes would include changing past dates to present or future dates; changing the days of the week to be included in the study period, or changing the hours of the day to be reported.

*** PRACTICE EXERCISE ***

Use the NTP to answer the question.

1. What does the TFS303 warning message indicate?

*** ANSWER ***

1. What does the TFS303 warning message indicate?

   This message warns that the associated traffic measurement data was accumulated over a period greater than one hour .

The following is an example of how and where this message may appear on a traffic report:

```
279  TFS000
13   08    1984
14   00    03

TFS303
```

You will now review the output format and meaning of two more warning messages:

- TFS401
- TFS402

Turn to page 2-5 in the NTP Section 2.33 and read about these two reports.

*** RETURN HERE WHEN YOU HAVE FINISHED READING. ***

TFS401/402 messages differ from the other traffic record types in that they are transient in nature and are not stored, unless the customer is equipped with the History File option. Except in the latter case, they cannot be manually requested from the Meridian SL-1.

The only time these messages are printed out is when an established speech path, which has been held up for longer than 36 CCS, is finally disconnected. This may occur at any given moment of the day, even while the Meridian SL-1 is printing out other data (including traffic reports). Therefore, these messages will only be available to a terminal which is on-line at the time the long connection was disconnected.

The TFS401/402 messages are significant in that frequently they represent data calls with long holding times. As data applications become more and more a part of telecommunications, the impact of these high-traffic connections becomes significant.

Like all other Meridian SL-1 traffic measurements, these messages are not output until a connection is idled. Typically, a data connection which is set up at the beginning of the day (which may include voice also), and is held up for the entire day, will not be disconnected until the end of the day. Therefore, TFS402 messges may not be seen until the last hour of the day. However, the time slots involved in those connections were not available for use all day. Even though the usage is accumulated against the last hour, the long holding times effectively contributed to possible network blockage all day.

In the Meridian SL-1 connections of up to 83 minutes each (50 CCS) are included in the normal traffic statistics. However, connections of greater than 83 minutes are not, and it is these which have the most impact on grade of service being provided by a Meridian SL-1 as described above.

Since the TFS402 message gives the TN's of the terminals involved and the total CCS of the connection, it is possible to add the CCS per connection back into the affected traffic reports to determine the actual traffic load on the various system elements. The reports that would be affected include TFS001 and TFS007 (in multi-group switches) TFC001, and TFC002.

Simply determine the hour in which the message was output (the hour following the TFS402 message), divide the total CCS per connection by 36, count backwards that number of hours from the time output, and add 36 CCS (representing long connection CCS) per connection to each element in the affected traffic report (i.e., each loop, junction group, or route with one or more long connections). This will give a close approximation of the actual traffic load including these long connections. Long connection data should be added in once per terminal's loop to each of TFS001 and TFS007, and once per connection to each of TFC001 and TFC002. For the latter, the direction of usage (incoming, outgoing, or two-way) must be known, and may be determined from the corresponding route for each trunk TN.

Systems that show a great deal of TFS402 messages may show some network blockage, yet show low loop traffic on the terminal loops. Calculation of the actual load, as outlined above, may shed some light on the situation by revealing overloaded loops.

In any system, it is important that terminals with typically long holding times be distributed evenly over all loops, to minimize network blockage.

*** PRACTICE EXERCISE ***

1. What does the TFS4Ø1 warning message indicate?

2. What does the TFS4Ø2 warning message indicate?

*** ANSWER ***

1. What does the TFS4Ø1 warning message indicate?

   Identifies connections that were held for at least 36 CCS but less than 5Ø CCS. The message includes the measurements (pegs and usage) in the regular traffic data.

2. What does the TFS4Ø2 warning message indicate?

   Identifies connections that were held for 5Ø CCS or longer. The message does not include the measurements (pegs and usage) in the regular traffic data.

Now that you know what these warning messages mean you need to take a look at the format for these messages.

The format is as follows:

TFS4ØX CCS TN1 TN2 TYPE

The area(s) being reviewed will be **highlighted.**

The highlighted number identifies the message.

TFS40 **X** CCS TN1 TN2 TYPE

EXAMPLE: TFS401 or TFS402

This CCS gives the usage on the connection.

TFS40X **CCS** TN1 TN2 TYPE

*** PRACTRICE EXERCISE ***

Use the message format to answer the questions below.

TFS401 40 TN1 TN2 TYPE

1. What is the number of the warning message? _____

2. What is the CCS on the connection? _____

*** ANSWER ***

1. What is the number of the warning message? 401

2. What is the CCS on the connection? 40

The TN1 and TN2 identify the terminal (Loop, Shelf, Card, Unit) involved in the connection.

TFS40X CCS **TN1 TN2** TYPE

EXAMPLE: TFS401 36 8 1 7 1 Ø Ø 8 Ø TYPE

*** PRACTICE EXERCISE ***

Use the message format to answer the questions below.

TFS40X CCS TN1 TN2 TYPE

1. What do the TN1 and TN2 indicate?

*** ANSWER ***

1. What do the TN1 and TN2 indicate?

   The teminals (Loop, Shelf, Card, Unit) involved in the connection.

The type is a number which identifies to what use the network path was put. Turn to page 2-6 in the NTP and review Table 2-A NETWORK PATHS USAGE IDENTIFICATION.

*** RETURN HERE WHEN YOU HAVE FINISHED ***

TFS40X CCS TN1 TN2 **TYPE**

Example: TFS40X CCS TN1 TN2 1

*** PRACTICE EXERCISE ***

Use the NETWORK DATA USAGE IDENTIFICATION TABLE in the NTP to answer the following?

1. What was the network path used for in the following warning message?

   TFS40X CCS TN1 TN2 Ø _____

2. What was the network path used for in the following warning message?

   TFS40X CCS TN1 TN2 7 _____

*** ANSWER ***

1. What was the network path used for in the following warning message?

   TFS40X CCS TN1 TN2 Ø DIAL TONE

2. What was the network path used for in the following warning message?

   TFS40X CCS TN1 TN2 7 Unknown use of a TDS

Continue on to the review of two more warning messages.
These are the TFS411 and TFS412 messages.

Turn to page 2-6 in the NTP and read Section 2.35.

*** RETURN HERE WHEN YOU HAVE FINISHED READING ***

The TFS411/412 messages are actually a summarization of the TFS401/ TFS402 messages that were output since the last traffic report. These messages are output for the benefit of those collecting traffic data remotely, or whose TTY is not on-line with the Meridian SL-1.

- TFS401 messages are compiled under TFS411 messages.
- TFS402 messages are compiled under TFS412 messages.

However, as stated in the NTP, not all the data given in the TFS401/402 messages is included in the TFS411/412 messages.

The TFS411/412 messages are always output together and normally appear (if one or the other is non-zero) immediately following all threshold violations and before the first scheduled system or customer option. However, they will also appear before any system or customer traffic data, or both, which is invoked manually.

These messages are significant in that they contribute a total count of the TFS401/402 messages which were output since the last traffic report, as well as a sum of the total CCS per connection for all of those connections. Since they are not output until after a long connection is idled, these messages, like TFS401/402 messages, may not be seen until the last hour of the day.

*** PRACTICE EXERCISE ***

Use the NTP Section 2.35 to answer the following questions.

1. What warning messages indicate connections with high holding times when the traffic TTY is not on line to receive messages? _____

*** ANSWER ***

1. What warning messages indicate connections with high holding times when the traffic TTY is not on line to receive messages? TFS411 TFS412

The actual output format for these two warning messages differs from that for TFS401 and TFS402 warning messages.

The following is an example of TFS411/412 reports:

```
0423 TFS411
                          For all TFS401 messages since last report.
  00001  0000043

0423 TFS412
  00002  0000167          For all TFS402 messages since last report.
```

Breakdown of report(s):

The system ID on both reports.

```
0423 TFS411                              0423 TFS412
                                           00002  0000167
  00001  0000043
```

The Total peg count on both reports.

```
0423 TFS411                              0423 TFS412
                                           00002  0000167
  00001  0000043
```

The total CCS on both reports.

```
0423 TFS411                              0423 TFS412
                                           00002  0000167
  00001  0000043
```

From the information given in the TFS411/412 messages, the average holding time per long connection can be calculated. This is useful if the TFS401/402 messages with the exact CCS per connection are not available. To calculate this, use the following formula:

$$\frac{\text{Total CCS for all long connections (for either type)}}{\text{Total number of long connections (for either type)}}$$

The results may be converted to minutes by dividing by 0.6, or to hours by dividing by 36.

EXAMPLE:

```
0423 TFS411                    43 CCS
                               ------   = 43 CCS/connection =
  00001  0000043                 1          72 minutes or 1.2 hours

0423 TFS412                   167 CCS
                              -------   = 83.5 CCS per connection =
  00002  0000167                2          139 minutes or 2.3 hours
```

SUMMARY WARNING MESSAGES:

Warning messages are the way the system informs you that a certain event has occurred during the accumulation of traffic data (initialization, system reload, etc.).

- TFS301 - A warning that data has been corrupted by an intitalization and should be ignored.
- TFS302 - A warning that the traffic schedule was changed during the interval covered by the traffic measurement data and may be invalid.
- TFS303 - A warning that associated traffic measurement data was accumulated over a period greater than one hour, and the data should be disregarded.
- TFS401 - A warning that identifies connections that are held for at least 36 CCS but less than 50 CCS.
- TFS402 - A warning that identifies connections that are held for 50 CCS or longer.
- TFS411 - A warning that summarizes connections that are held for at least 36 CCS but less than 50 CCS when the traffic TTY is not on-line to receive messages.
- TFS412 - A warning that summarizes connections that are held for 50 CCS or longer when the traffic TTY is not on-line to receive messages.

This concludes part 2 of this module and the last part of this course. If you are unsure of any of the material that has been covered, review before continuing on to the selfcheck.

MODULE 6 SELF CHECK

The self check has two parts:

- Part one requires you to identify:
  - What caused the threshold(s) to be printed.

- Part two requires you to identify:
  - Warning messages

PART 1.

Use the reports below to answer the questions that follow.

```
Ø21    TFSØØØ
16     Ø9  1984
14     ØØ   ØØ

Ø21    TFS1Ø1
       ØØØØ5    ØØØØØ

Ø21    TFS1Ø2

ØØ     ØØØØ623  ØØ58Ø

Ø21    TFC1Ø3
ØØØ
       ØØ25Ø    ØØ12Ø
```

1. What caused the TFS1Ø1 threshold to be printed?

2. What caused the TFS1Ø2 threshold to be printed?

3. What caused the TFC1Ø3 threshold to be printed?

*** ANSWER ***

1. What caused the TFS1Ø1 threshold to be printed?

   The threshold was not set. .5% violation

2. What caused the TFS1Ø2 threshold to be printed?

   Threshold violated

```
  623
 -58Ø
 ----
   43 CCS exceeded
```

3. What caused the TFC1Ø3 threshold to be printed?

   Threshold violated.

```
  25Ø
 -12Ø
 ----
  13Ø tenths of a second exceeded
```

PART 2.

Use the warning message below to answer the questions that follow.

```
Ø21    TFSØØØ
 23    1Ø  1984
 Ø8    ØØ  ØØ

TFS3Ø1

TFS4Ø1    39    ØØ1    ØØ    Ø3    Ø4   1Ø
```

1. What does the TFS3Ø1 warning message indicate?

2. What does the TFS4Ø1 warning message indicate?

*** ANSWER ***

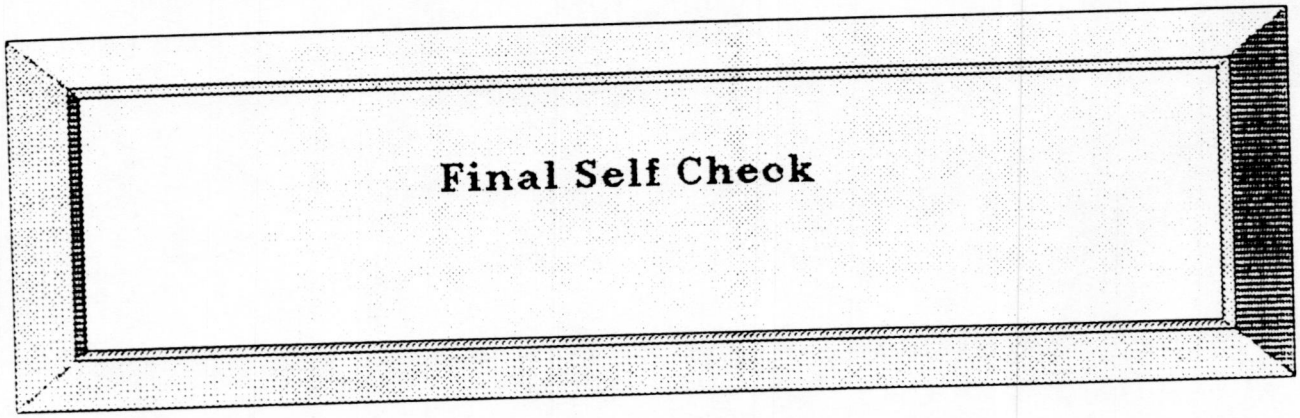
1. What does the TFS3Ø1 warning message indicate?

   This message precedes traffic data that is output after a Meridian SL-1 initialization. The message warns that data has been corrupted by the initialization and should be ignored.

2. What does the TFS4Ø1 warning message indicate?

   Outgoing trunk connection was held for 39 CCS.

This concludes the self-check for module 6. Continue on to the final SelfCheck if you understand all of the information presented in this course.


Final Self Cheok

FINAL SELF CHECK

This self check has two parts:

- Part one requires you to analyze traffic reports.
- Part two requires you to select recommended action(s) you would take to resolve any problem(s) you found in the analysis of the reports in part one of this self check.

NOTE: Use the modules if you need help with this self-check. Do not spend too much time on any of the exercises.

PART 1.

Write your analysis of the reports in the appropriate space provided.

YOUR TFS411 ANALYSIS RESULTS :

YOUR TFS412 ANALYSIS RESULTS :

YOUR TFS001 ANALYSIS RESULTS :

YOUR TFSØØ1 ANALYSIS RESULTS CONTINUED :

YOUR TFS001 ANALYSIS RESULTS CONTINUED :

YOUR TFS002 ANALYSIS RESULTS :

YOUR TFS003 ANALYSIS RESULTS :

YOUR TFS004 ANALYSIS RESULTS :

YOUR TFS007 ANALYSIS RESULTS :

YOUR TFC001 ANALYSIS RESULTS :

YOUR TFC002 ANALYSIS RESULTS :

YOUR TFC003 ANALYSIS RESULTS :

YOUR TFC004 ANALYSIS RESULTS :

Answers for part 1 are on the following pages.

Use the information and the traffic reports below to answer the questions on the following pages.

INFORMATION: The system that generated the following traffic reports contains 11 Digitone receivers.

The high idle cycle count for this system is 3,525,196.

104 TFS000

13 10 1986
15 00 01

104 TFS411

00002 0000080

104 TFS412

00000 0000000

104 TFS001

00	TERM	00000	0000006	00009	00010	0000391	00258
01	TERM	00000	0000001	00003	00002	0000296	00141
02	TERM	00000	0000012	00014	00009	0000444	00304
03	TERM	00000	0000002	00003	00006	0000375	00161
04	TERM	00000	0000023	00006	00009	0000486	00236
05	TERM	00000	0000010	00009	00005	0000415	00199
06	CONF	00000	0000000	00000	00000	0000004	00057
07	TDS	00000	0000000	00000	00009	0000001	00007
08	TERM	00000	0000097	00033	00017	0000710	00349
09	TERM	00000	0000016	00013	00006	0000462	00243
10	TERM	00000	0000050	00027	00013	0000501	00334
11	TERM	00017	0000018	00017	00106	0000695	00327
12	TERM	00000	0000032	00026	00012	0000661	00361
13	TERM	00000	0000018	00012	00014	0000532	00269
14	CONF	00000	0000000	00000	00000	0000003	00054
15	TDS	00000	0000000	00000	00000	0000271	04981

```
104 TFS002

00     00000    0000034    02107
01     00000    0000005    00105
02     00000    0000009    00149
03     00000    0000081    00938
04     00000    0000059    00720
05     00000    0000005    00041
06     00004    0000079    00928
07     00000    0000000    00000
08     00006    0000119    02047
09     00000    0000006    00111
10     00000    0000000    00000

104 TFS003

  00000     00000     00002

104 TFS004

2208861    03293    00183
  00000    00000
  00000    00000
  00000

 104 TFS007

 01     00000  0000790   00572
 02     00005  0000656   00504
 12     00000  0000767   00580
```

(Note: The TFC007 data does not relate to the TFS001 data in this example, as it is from a different system.

```
104 TFC001
00
  00004      0000943        00382
  00020      0001265        00720
  00006      0000272        00385
  00000      0000112        00032
  00031        00188        00178
```

```
104 TFC002
00
00  CO

  00035      00035

  0000000    00000
  0000562    00384
  00000      00000
  00046


 01  TIE

  00041      00040

0000400      00106
0000745      00354
  00074      00100
  00000


02   DID

  00030      00030

0000627      00282
0000000      00000
  00000      00000
  00000
```

```
Ø3   TIE

  ØØØØ3      ØØØØ3

ØØØØØØ6      ØØØØ8
ØØØØØØ1      ØØØØ3
  ØØØØØ      ØØØ34
  ØØØØØ

Ø4   WATT

  ØØØØ2      ØØØØ2

ØØØØØØØ      ØØØØ9
ØØØØØØ6      ØØØØ2
  ØØØØØ      ØØØØØ
  ØØØØØ

Ø7   TIE

  ØØØØ3      ØØØØ3

ØØØØØ22      ØØØ18
ØØØØØ63      ØØØØ9
  ØØØ11      ØØØ28
  ØØØØØ
```

```
104 TFC003

00
  00065    00040
  00007    00151
  00006    00090

104 TFC004

00
01

  00013    0000005
  00015    0000002
0000026    0000007
  00000

02

  00014    0000004
  00016    0000002
0000031    0000006
  00000
```

TFS411 ANALYSIS RESULTS :

2 calls exceeded 36 CCS for a total connection time of 80 CCS. The average holding time per connection is 40 CCS, or 67 minutes, or 1.1 hours.

TFS412 ANALYSIS RESULTS :

No problem indicated.

TFS001 ANALYSIS RESULTS :

INTERLOOP MEASUREMENTS PER LOOP

LOOP	FTM'S	CCS	PC
0	10 - 2 x 0 = 10	391 - 2 x 6 = 379	258 - 2 x 9 = 240
1	2 - 2 x 0 = 2	296 - 2 x 1 = 294	141 - 2 x 3 = 135
2	9 - 2 x 0 = 9	444 - 2 x 12 = 420	304 - 2 x 14 = 276
3	6 - 2 x 0 = 6	375 - 2 x 2 = 371	161 - 2 x 3 = 155
4	9 - 2 x 0 = 9	486 - 2 x 23 = 440	236 - 2 x 6 = 224
5	5 - 2 x 0 = 5	415 - 2 x 10 = 395	199 - 2 x 9 = 181
8	17 - 2 x 0 = 17	710 - 2 x 97 = 516	349 - 2 x 33 = 283
9	6 - 2 x 0 = 6	462 - 2 x 16 = 430	243 - 2 x 13 = 217
10	13 - 2 x 0 = 13	501 - 2 x 50 = 401	334 - 2 x 27 = 280
11	140 - 2 x 17 = 106	695 - 2 x 18 = 659	327 - 2 x 17 = 293
12	12 - 2 x 0 = 12	661 - 2 x 32 = 597	361 - 2 x 26 = 309
13	14 - 2 x 0 = 14	532 - 2 x 18 = 496	269 - 2 x 12 = 245

TFS001 CONTINUED: INTRA/INTERLOOP BLOCKAGE PER LOOP

LOOP	INTRA	INTER
0	0 / (9 + 0) x 100 = 0 %	10 / (240 + 10) x 100 = 4. %
1	0 / (3 + 0) x 100 = 0 %	2 / (135 + 2) x 100 = 1.5 %
2	0 / (14 + 0) x 100 = 0 %	9 / (276 + 9) x 100 = 3.2 %
3	0 / (3 + 0) x 100 = 0 %	6 / (155 + 6) x 100 = 3.7 %
4	0 / (6 + 0) x 100 = 0 %	9 / (224 + 9) x 100 = 3.9 %
5	0 / (9 + 0) x 100 = 0 %	5 / (181 + 5) x 100 = 2.7 %
8	0 / (33 + 0) x 100 = 0 %	17 / (283 + 17) x 100 = 5.7 %
9	0 / (13 + 0) x 100 = 0 %	6 / (217 + 6) x 100 = 2.7 %
10	0 / (27 + 0) x 100 = 0 %	13 / (280 + 13) x 100 = 4.4 %
11	17 / (17 + 17) x 100 =50. %	106 / (293 + 106) x 100 = 26.6 %
12	0 / (26 + 0) x 100 = 0 %	12 / (309 + 12) x 100 = 3.7 %
13	0 / (12 + 0) x 100 = 0 %	14 / (245 + 14) x 100 = 5.4 %

TFS001 CONTINUED: TOTAL LOOP BLOCKAGE PER LOOP

LOOP	PERCENT BLOCKAGE
0	$\frac{0 + 10}{0 + 9 + 10 + 240} \times 100 = 3.9\ \%$
1	$\frac{0 + 2}{0 + 3 + 2 + 135} \times 100 = 1.4\ \%$
2	$\frac{0 + 9}{0 + 14 + 9 + 276} \times 100 = 3.0\ \%$
3	$\frac{0 + 6}{0 + 3 + 6 + 155} \times 100 = 3.7\ \%$
4	$\frac{0 + 9}{0 + 6 + 9 + 224} \times 100 = 3.8\ \%$
5	$\frac{0 + 5}{0 + 9 + 5 + 181} \times 100 = 2.6\ \%$
8	$\frac{0 + 17}{0 + 33 + 17 + 283} \times 100 = 5.0\ \%$
9	$\frac{0 + 6}{0 + 13 + 6 + 217} \times 100 = 2.5\ \%$
10	$\frac{0 + 13}{0 + 27 + 13 + 28} \times 100 = 4.0\ \%$
11	$\frac{17 + 106}{17 + 17 + 106 + 293} \times 100 = 28.4\ \%$
12	$\frac{0 + 12}{0 + 26 + 12 + 309} \times 100 = 3.5\ \%$
13	$\frac{0 + 14}{0 + 12 + 14 + 245} \times 100 = 5.2\ \%$

TFSØØ1 CONTINUED

TOTAL SYSTEM BLOCKAGE

$$\frac{17}{17+9+3+14+3+6+9+33+13+27+26+12} = .089 \text{ TOTAL INTRALOOP BLOCKAGE}$$

$$\frac{10+2+9+6+9+5+17+6+13+106+12+14}{209+240+135+276+155+224+181+283+217+280+293+309+245} = .068 \text{ TOTAL INTERLOOP BLOCKAGE}$$

$$\frac{1}{12} \times .090 + \frac{12-1}{12} \times .068 \times 100 = 6.9\ \%\ \text{TOTAL SYSTEM BLOCKAGE}$$

Loops 8, 11, and 12 exceeded 600 CCS.

The difference between the lowest loop CCS (296) and the highest loop CCS (710) exceeds 100 CCS meaning that this system is unbalanced.

TFS002 ANALYSIS RESULTS:

AVERAGE CCS/PER DTR

$$\frac{119}{11} = 10.8$$

BLOCKAGE

$$\frac{6}{2047 + 6} \times 100 = 0.3\ \%$$

AVERAGE HOLDING TIME IN SECONDS

$$\frac{119}{2047} \times 100 = 5.8 \text{ SECONDS}$$

TFS003 ANALYSIS RESULTS :

Total Dial Tone delay for all calls equals 2 seconds.

TFS004 ANALYSIS RESULTS :

% REAL TIME USED:

$$\frac{3525196 - 2208861}{3525196} \times 3600 = 1{,}344 \text{ seconds used}$$

$$\frac{1344}{3600} \times 100 = 37\%$$

% REAL TIME REMAINING:

$$\frac{2208861}{3525196} - \left(1 - \frac{2500}{3600}\right) \times 100 = 32\%$$

$$.32 \times 3600 = 1{,}155 \text{ sec. remaining}$$

TFS007 ANALYSIS RESULTS:

JUNCTOR GROUP 01:

$$\frac{0}{572 + 0} = 0\% \text{ BLOCKAGE}$$

JUNCTOR GROUP 02:

$$\frac{5}{504 + 5} = 1\% \text{ BLOCKAGE}$$

JUNCTOR GROUP 12:

$$\frac{0}{580 + 0} = 0\% \text{ BLOCKAGE}$$

Junctor traffic exceeds 500 CCS per group

TFC001 ANALYSIS RESULTS :

GRADE OF SERVICE

INCOMING; Percent of total traffic

$$\frac{943}{2592} = 36\ \%$$

Blockage

$$\frac{4}{382 + 4} \times 100 = 1.\%$$

TFCØØ1 ANALYSIS RESULTS CONTINUED:

GRADE OF SERVICE CONTINUED

Holding time

$$\frac{943}{382} = 2.468 \qquad \frac{2.468}{0.6} = 4.1 \text{ minutes}$$

OUTGOING; Percent of total traffic

$$\frac{1265}{2592} = 49\ \%$$

Blockage

$$\frac{20}{720 + 20} \times 100 = 2.7\%$$

Holding time

$$\frac{1265}{720} = 1.756 \qquad \frac{1.756}{0.6} = 2.9 \text{ minutes}$$

INTRACUSTOMER; Percent of total traffic

$$\frac{272}{2592} = 10\%$$

Blockage

$$\frac{6}{385 + 6} \times 100 = 1.5\%$$

Holding time

$$\frac{272}{385} = 0.706 \qquad \frac{0.706}{0.6} = 1.2 \text{ minutes}$$

TFC001 ANALYIS RESULTS CONTINUED:

GRADE OF SERVICE CONTINUED

TANDEM; Percent of total traffic

$$\frac{112}{2592} = 4\%$$

Blockage

$$\frac{0}{32 + 0} \times 100 = 0\%$$

Holding time

$$\frac{112}{32} = \frac{3.5}{0.6} = 5.8 \text{ minutes}$$

INTRA-OFFICE RATIO (RATIO OF STATION-TO-STATION TRAFFIC TO TOTAL STATION TRAFFIC)

$$\frac{2 \times 272}{943 + 1265 + (2 \times 272)} = 0.197\ (20\%)$$ INTRA-OFFICE RATIO

TFC002 ANALYSIS RESULTS :

ROUTE

Ø : Blockage: Ø %

CCS per trunk: $\frac{562}{35} = 16$ CCS

Holding time per call: (MINUTES) $\frac{562}{384} = 1.463$

$\frac{1.463}{0.6} = 2.4$ min.

Ø1: Blockage: $\frac{74}{354 + 74} \times 100 = 17.3\%$

CCS per trunk: $\frac{400 + 745}{40} = 28.6$ CCS

Holding time per call: (MINUTES) $\frac{1145}{460} = 2.489$

$\frac{2.489}{0.6} = 4.1$ min.

TFCØØ2 ANALYSIS RESULTS CONTINUED:

ROUTE

Ø2 : Blockage: Ø% (actually non-applicable)

CCS per trunk:

$$\frac{627}{30} = 21 \text{ CCS}$$

Holding time per call: (MINUTES)

$$\frac{627}{282} = 2.223 \qquad \frac{2.223}{0.6} = 3.7 \text{ min.}$$

Ø3 : Blockage: Ø %

CCS per trunk:

$$\frac{6 + 1}{3} = 2 \text{ CCS}$$

Holding time per call: (MINUTES)

$$\frac{7}{11} = Ø.636 \qquad \frac{Ø.636}{Ø.6} = 1.Ø \text{ min.}$$

Ø4: Blockage: Ø %

CCS per trunk:

$$\frac{6}{2} = 3 \text{ CCS}$$

Holding time per call: (MINUTES)

$$\frac{6}{2} = 3 \qquad \frac{3}{Ø.6} = 5 \text{ min.}$$

Ø7: Blockage:

$$\frac{11}{9 + 11} \times 1ØØ = 55\%$$

CCS per trunk:

$$\frac{22 + 63}{3} = 28.3 \text{ CCS}$$

Holding time per call: (MINUTES)

$$\frac{85}{27} = 3.148 \qquad \frac{3.148}{Ø.6} = 5.2 \text{ min.}$$

TFCØØ3 ANALYSIS RESULTS:

Average speed of answer: $\frac{ØØ65}{1Ø} = 6.5$ seconds

Average time in queue: $\frac{151}{1Ø} = 15.1$ seconds

Average attendant response: $\frac{ØØ4Ø}{1Ø} = 4.Ø$ seconds

Average wait time abandoned calls: $\frac{9Ø}{1Ø} = 9.Ø$ seconds

TFCØØ4 ANALYSIS RESULTS:

BOTH CONSOLES:

Total calls 13+15+14+16 = 58 Avg. calls/console: $\frac{58}{2} = 29$

Total work time 7+6 = 13 CCS

Total time manned 26+31 = 57 CCS

% calls delayed $\frac{7}{58} = 12\ \%$

% abandoned calls $\frac{6}{58} = 1Ø.3\%$

% time manned $\frac{57}{72} = 79\%$

TFCØØ4 ANALYSIS RESULTS CONTINUED:

Work time per call;

All calls $\frac{13}{58}$ = 22.4 seconds

External $\frac{2+2}{15+16}$ = 12.9 seconds

Internal $\frac{5+4}{13+14}$ = 33 seconds

CONSOLE Ø1:

Time manned: $\frac{26}{36} \times 100 = 72.2\ \%$

Work time per call

All calls $\frac{7}{28} \times 100 = 25$ seconds

External $\frac{2}{15} \times 100 = 13$ seconds

Internal $\frac{5}{13} \times 100 = 38$ seconds

TFC004 ANALYSIS RESULTS CONTINUED:

CONSOLE 2

Time manned: $\frac{31}{36} \times 100 = 86.1\ \%$

Work time per call

All calls $\frac{6}{30} \times 100 = 20$ seconds

External $\frac{2}{16} \times 100 = 12.5$ seconds

Internal $\frac{4}{14} \times 100 = 29$ seconds

PART 2

Use the traffic analysis results from the previous pages to answer the following question(s).

1. Place a check mark by the action(s) you would take to resolve the problems found in TFS411 and TFS412.

RECOMMENDED ACTION

1. _____ Verify that all trunks are in good working order.
2. _____ Occassionally allow the system to complete audits in order to clear time slots that might be hung up.
3. _____ Reprimand the users with excessive conversation time.
4. _____ Add the CCS for each long connection back into the traffic reports.

2. Place a check mark by the action(s) you would take to resolve the problem(s) found in TFSØØ1.

RECOMMENDED ACTION

1. _____ Move some of the sign usage phones and trunks out of loop(s) 8, 11 and 12 to lower usage loops (Ø,1,3), to reduce blockage.
2. _____ Add more equipment to balance out the system.
3. _____ Remove shelves from the high-usage loops.
4. _____ No action required.

3. Place a check mark by the action(s) you would take to resolve the problem(s) found in TFS002.

RECOMMENDED ACTION

1. _____ Remove excess DTRs.
2. _____ Install additional DTRs.
3. _____ Reduce blockage in the system before taking further action.
4. _____ Add another TDS loop.

4. Place a check mark by the action(s) you would take to resolve the problem(s) found in TFS003.

RECOMMENDED ACTION

1. _____ Install additional DTR's
2. _____ Have users hang up and try again if they don't receive dial tone.
3. _____ Classify all DID and tie trunks as dial pulse (DIP) instead of Digitone (DTN).
4. _____ No action required.

5. Place a check mark by the action(s) you would take to resolve the problem(s) found in TFS004.

RECOMMENDED ACTION

1. _____ No action required.
2. _____ Upgrade the CPU to a faster processor.
3. _____ Have the users talk longer on each call and make fewer calls.
4. _____ Classify all stations as low priority, but all trunks as high priority.

6. Place a check mark by the action(s) you would take to resolve the problem(s) found in TFSØØ7.

RECOMMENDED ACTION

1. _____ Add another network group.
2. _____ Reduce junctor blockage by rebalancing traffic on high-usage loops in network groups Ø and 2.
3. _____ Put stations with the same community of interest on separate loops in network groups 1 and 3.
4. _____ Have users in network groups Ø and 1 make fewer calls.

7. Place a check mark by the action(s) you would take to resolve the problem(s) found in TFCØØ4.

RECOMMENDED ACTION

1. _____ Install DID service.
2. _____ Add another console.
3. _____ No action required.
4. _____ Replace the attendants.

8. Place a check mark by the action(s) you would take to resolve the problem(s) found in TFCØØ2.

RECOMMENDED ACTION

1. _____ Reduce the amount of time spent on outgoing WATS calls.
2. _____ Redistribute high-usage trunks evenly over the loops.
3. _____ Add more trunks to routes 1 and 7.
4. _____ No action required.

PART 2

*** ANSWERS ***

1. Place a check mark by the action(s) you would take to resolve the problems in TFS411 and TFS412.

RECOMMENDED ACTION

1. __X__ Verify that all trunks are in good working order.
2. _____ Occassionally allow the system to complete audits in order to clear time slots that might be hung up.
3. _____ Reprimand the users with excessive conversation time.
4. _____ Add the CCS for each long connection back into the traffic reports.

2. Place a check mark by the action(s) you would take to resolve the problem(s) found in TFSØØ1.

RECOMMENDED ACTION

1. __X__ Move some of the high usage phones and trunks out of loop(s) 8, 11 and 12 to lower usage loops (Ø,1,3), to reduce blockage.
2. _____ Add more equipment to balance out the system.
3. _____ Remove shelves from the high-usage loops.
4. _____ No action required.

3. Place a check mark by the action(s) you would take to resolve the problem(s) found in TFS002.

RECOMMENDED ACTION

1. _____ Remove excess DTRs.
2. _____ Install additional DTRs.
3. __X__ Reduce blockage in the system before taking further action.
4. _____ Add another TDS loop.

4. Place a check mark by the action(s) you would take to resolve the problem(s) found in TFS003.

RECOMMENDED ACTION

1. _____ Install additional DTR's.
2. _____ Have users hang up and try again if they don't receive dial tone.
3. _____ Classify all DID and tie trunks as dial pulse (DIP) instead of Digitone (DTN).
4. __X__ No action required.

5. Place a check mark by the action(s) you would take to resolve the problem(s) found in TFS004.

RECOMMENDED ACTION

1. __X__ No action required.
2. _____ Upgrade the CPU to a faster processor.
3. _____ Have the users talk longer on each call and make fewer calls.
4. _____ Classify all stations as low priority, but all trunks as high priority.

6. Place a check mark by the action(s) you would take to resolve the problem(s) found in TFS007.

RECOMMENDED ACTION

1. _____ Add another network group.
2. __X__ Reduce junctor blockage by rebalancing traffic on high-usage loops in network groups 0 and 2.
3. _____ Put stations with the same community of interest on separate loops in network groups 1 and 3.
4. _____ Have users in network groups 0 and 1 make fewer calls.

7. Place a check mark by the action(s) you would take to resolve the problem(s) found in TFC004.

RECOMMENDED ACTION

1. _____ Install DID service.
2. _____ Add another console.
3. __X__ No action required.
4. _____ Replace the attendants.

8. Place a check mark by the action(s) you would take to resolve the problem(s) found in TFC002.

RECOMMENDED ACTION

1. _____ Reduce the amount of time spent on outgoing WATS calls.
2. _____ Redistribute high-usage trunks evenly over the loops.
3. __X__ Add more trunks to routes 1 and 7.
4. _____ No action required.

Congratulations! This concludes the self-paced traffic course. Do not be alarmed if you cannot recall everything that was presented. This course material and the NTP will serve as a good reference when you are looking at your traffic reports.

CONTENTS

CONTENTS PAGE

Reason for Reissue: This practice is reissued to incorporate changes and additions resulting from the introduction of Generic X11 Releases 3 and 4. Because of the extent of revisons, bracketing arrows and arrowheads have been omitted.

* SL-1 is a trademark of Northern Telecom Limited

1. GENERAL

1.01 Traffic measurements are essential for monitoring the performance of a switching machine, for identifying potential congestion problems and for planning future growth of the switching machine. The SL-1 Business Communications Systems are equipped with traffic data accumulation capabilities which are resident in the system memory and function as part of the normal call processing software operations.

1.02 The purpose of this practice is to describe the traffic measurement data acquired at an SL-1 switch, discuss the conditions under which the data is accumulated, interpret the traffic measurement data output formats and explain the command structures that are available to control the traffic data collection and printing.

Reference Documentation

1.03 Overlay loading instructions are provided in the following practices (depending on machine type):

553-2001-315	General Input/Output Information
553-2YY1-311	Data Administration Manual II: Input/Output Reference Manual.

1.04 For maintenance diagnostic information, refer to the following practices (depending on machine type):

553-2001-505	Diagnostic Programs Description and Input/Output
553-2301-511	Maintenance Manual II: Diagnostic Programs Description and Input/Output Reference Manual.

2.06 Peg Count. A peg count is a count of a particular event.

2.07 Failure to Match. A Failure To Match (FTM) occurs if no idle network path can be found between two given connection points.

2.08 Usage. The usage of a resource (e.g., time slots of a loop, trunks of a given trunk group, junctors between network groups) is the time measurement, in 100 call-seconds (CCS), of how long the elements of the resource have been busy.

2.09 Established Path. An established path between two terminals is a path in which the called terminal has answered and both terminals are in the talking connection. There are cases involving outgoing trunks in which the terminals are in a talking connection but, because the SL-1 does not yet consider outpulsing to be complete, the path is not an established path. If this path is idled, then measurements requiring 'established connections' will not be accumulated.

2.10 Service Loop. A service loop is either a Tone and Digit Switch (TDS) loop or an MF Sender (MFS) loop. As both types of loops serve similar functions, they have similar traffic measurements. Whenever the term 'service loop' is used, it refers to either a TDS loop or an MFS loop.

MEASUREMENT PROCESS

2.11 There are five facets to traffic data collection in SL-1: Accumulation, Holding, Printing, Control and Outputting.

2.12 Accumulation. When the SL-1 system takes any action that has associated traffic measurement(s), the relevant peg counts, usages, etc., are updated in accumulating registers associated with those measurements. The traffic data are automatically accumulated by the call processing software regardless of any measurement schedules, options, thresholds, etc., that may or may not be in effect at the time.

2.13 Whenever any network path is seized, the time of day, in units of 2 s, is stored in a register associated with that network path. When the path is subsequently idled, the previously stored time is subtracted from the current time of day to give a 'usage' on the path. This usage is added to the appropriate accumulating register(s) according to what the network path was used for (e.g., dial tone, outgoing trunk connection, conference connection). All usages are collected in units of 2 s and converted to CCS at the time of printing.

> **Note:** Because the usage (in CCS) is rounded off to the nearest integer, usage of less than 50 call-seconds is printed as 0 CCS.

2.14 Holding. According to user-defined schedules, the data in the accumulating registers are transferred into another set of registers, the holding registers. There is one holding register for each accumulating register. As a measurement is transferred from an accumulating register to the associated holding register, the accumulating register is set to zero so that it can start collecting data for the next period. The data in the holding registers can be examined and printed at will. Data in the holding registers do not change until the next scheduled transfer of data from the accumulating registers.

2.15 Certain traffic measurements have an associated threshold. When measurement data is transferred into the holding registers, such measurements are compared with their thresholds and, if a measurement exceeds its threshold, then, regardless of the print options, a special message is printed together with one or more blocks of associated data.

2.16 **Printing.** When data is transferred from the accumulating registers to the holding registers, there are printing options that allow given blocks of data to be printed immediately. Furthermore, at any time before the next scheduled transfer of data, the holding registers can be accessed via the Traffic Control Overlay Program and blocks of data can be printed at will. It is only possible to print data from the holding registers. The accumulating registers are not accessed other than to transfer data from them to the holding registers.

> **Note:** Depending on the amount and type of data requested to be printed, a fast printer (e.g., 1200 baud with no 300 baud machine sharing the same function) may be required for large systems.

2.17 **Control.** The traffic measurement schedules, printing options, threshold levels and all other traffic-oriented parameters are controlled through the Traffic Control Overlay Program. This program may be loaded into the overlay area of the system memory to print, adjust or redefine any of the control parameters.

2.18 **Outputting.** The cycle of transferring data from the accumulating registers to the holding registers and the outputting of data is repeated in accordance with the user-defined traffic measurement schedules. When data is being output at the teletypewriter (TTY), the rate of printing is controlled by the amount of time the CPU can allocate to the task. As a result, all data may be output at once or may be output at intervals over a short period. Outputting of data starts when the data has been transferred from the accumulating registers to the holding registers and is completed prior to the next data transfer from the accumulating registers.

MEASUREMENT SOFTWARE

2.19 In addition to the traffic data accumulation programs in the call processing software, two traffic programs, a resident traffic print program and a traffic control overlay program, are used by the SL-1 system to print and control the call processing traffic measurements. (See the maintenance diagnostics reference manual for information about the relationship of these two programs to the other resident and overlay programs used by the SL-1 system to monitor and maintain call processing.)

2.20 Permanently in system memory, the resident Traffic Print program performs the following functions automatically:

- examines the traffic measurement schedules set up in the system
- transfers traffic data from the accumulating registers to holding registers according to the defined schedules
- prints the traffic data.

2.21 The Traffic Control overlay program resides on system tape and is designated overlay number 02. Before performing any tasks, this program must be loaded into the overlay area of the system memory. Loading can be done only from a teletypewriter (TTY). Once loaded the program enables the following functions to be performed:

- query traffic schedules, traffic options, threshold levels, system identification (ID) and system time-of-day
- modify the traffic schedules, traffic options and threshold levels
- access traffic data in the holding registers
- set the system time-of-day
- change the system ID.

2.22 When the required tasks are completed, the Traffic Control overlay program is aborted (by entering ****). With the traffic requirements defined to the system, control of the measurements is transferred to the resident traffic programs.

MEASUREMENT SCHEDULES

2.23 The SL-1 system can be programmed to provide traffic measurement outputs:

(a) for any defined day(s) of the week during a defined period of the year, specified by start day and end day

(b) for any defined period of the day specified by the start and end hours; i.e.,

- hourly, on the hour
- hourly, on the half-hour
- half-hourly, on the hour and half-hour.

2.24 The traffic measurement schedules are defined to control the period over which measurements are accumulated (hourly or half-hourly). After the proper interval, the resident Traffic Print program transfers the data from the accumulating registers to holding registers and resets the accumulating registers to zero so that measurements begin to accumulate for the next period. This transfer of data can occur hourly on the hour, hourly on the half-hour or every half-hour, as defined by the schedules.

RESTRICTIONS

2.25 An SL-1 system reset (system reload) or system initialization causes traffic measurements to be lost. When a reset occurs it is indicated by SYS000 being printed at the teletypewriter. An initialization is indicated by INI000 being typed.

2.26 System reset can be invoked manually or automatically by the system. It is invoked automatically in the event of a power failure or when system control dictates. On a system reset:

- data on the system tape is read into the system memory
- calls cannot be originated while the reload is in progress

2.34 Message output format is as follows:

TFS40X CCS TN1 TN2 TYPE

where,

- CCS gives the usage on the connection.
- TN1 and TN2 identify the terminals (Loop, Shelf, Card, Unit) involved in the connection. (Because the loops involved are identified, TFS001 figures can be corrected for previous hours. Also, the information can be used to identify faulty hardware where this is the cause of the long holding time.)
- TYPE is a number which identifies what use the network path was put to (see Table 2-A).

Table 2-A
NETWORK PATH USAGE IDENTIFICATION

TYPE NUMBER	USE
0	Dial Tone
1	Busy Tone
2	Overflow Tone
3	Ringback Tone
4	Tone Ringing
5	Miscellaneous Tone
6	Outpulsing
7	Unknown use of a TDS
8	Digitone Receiver
9	Incoming trunk speech path
10	Outgoing trunk speech path
11	Intracustomer speech path
12	Tandem trunk speech path
13	Reserved path not used

2.35 The traffic TTY may not always be on-line to receive messages. There is, therefore, a requirement for some indication of connections with high holding times with the regular traffic data. Both TFS411 and TFS412 will be given with the regular traffic output if and only if either measurement is nonzero when at least one block of data (system or customer) is scheduled.

(a) TFS411. This message provides a peg count of the number of connections that were held for at least 36 CCS but less than 50 CCS, together with the total usage (CCS) on the connections.

(b) TFS412. This message provides a peg count of the number of connections that were held for 50 CCS or longer, together with the total usage on the connections.

2.36 If these figures indicate a potential problem, then the traffic TTY can be turned on for subsequent hours and the TFS 401/402 messages used to obtain more information.

- dial tone speed
- loop traffic
- junctor traffic.

(e) Comparisons with the customer threshold levels for:

- incoming matching loss
- outgoing matching loss
- average speed of answer
- percent all trunks busy
- Off-Hook Queuing (OHQ) overflow.

TIME-OF-DAY AND DATE

2.41 The SL-1 system contains circuitry which generates timing signals that enable the CPU to execute real-time functions and keep an accurate time-of-day and date. To compensate for component tolerances, the time-of-day is corrected by making a daily adjustment. This adjustment is made automatically once a day at midnight.

2.42 The time-of-day and date of the system can be queried and adjusted manually if required. The query and adjustment are made via the teletypewriter. The manual adjustment is also required in the event of a system reset.

Time-Of-Day And Date Output

2.43 The time-of-day and date is included as part of scheduled traffic data outputs. It immediately follows the TFS000 header and precedes the traffic data. When the traffic data output is invoked via the Traffic Control program, then the time-of-day and date is not output. The time-of-day and date can, however, be queried via the Traffic Control program.

Note: In Generic X11, the length of each field in the time and date is increased by one digit.

Setting Time-of-Day and Date

2.44 The time-of-day and date must be redefined after a system reset (system reload) occurs.

WARNING: Since the traffic measurement schedule and midnight routines reference the time-of-day clock, these programs can be inadvertently triggered by time adjustment. For example, adjusting the time from 11:05 to 10:55 will result in the output of traffic data when the system clock reads 11:00, provided it is scheduled.

SYSTEM IDENTIFICATION

2.45 The system Identification (ID) is required when the SL-1 system is controlled from a central administration center. The system ID identifies the system from which the traffic measurements originate. Each SL-1 system is identified by a unique 3-digit number which is output as part of the traffic data.

Note: Feature measurements can only be made on one customer at a time for a given system because only one holding area is provided.

Customer Network Measurements

2.50 Customer network measurements (Generic X11) are identified by the prefix TFN. The 3-digit code following the measurement identifies the type of measurement:

- TFN001 - Route Lists
- TFN002 - Network Class-of-Service
- TFN003 - Incoming Trunk Group.

Threshold Violation Measurements

2.51 System threshold levels can be defined for:

(a) **Dial Tone Speed.** Failure to provide dial tone to a set within 3 s of the system recognizing the seizure of the line. Expressed as a percentage of total dial tone requests in units of 0.1%.

(b) **Loop Traffic.** The network loop usage per hour. Expressed in CCS.

(c) **Junctor Traffic.** The junctor group usage per hour. Expressed in CCS.

2.52 Customer threshold levels can be defined for:

(a) **Incoming Matching Loss.** Failure to match while attempting to set up a connection between an incoming trunk and an idle called line. Expressed as a percentage of total incoming connections in units of 0.1%.

(b) **Outgoing Matching Loss.** Failure to match while attempting to set up a connection between a line and an idle outgoing trunk. Expressed as a percentage of total outgoing connections in units of 0.1%.

(c) **Average Speed of Answer.** Average time, in units of 0.1 s, that calls wait to be answered by the attendant.

(d) **Percent Last Trunk Busy.** Last enabled trunk in a trunk group is made busy (incoming or outgoing). Expressed as a percentage of the total trunk connections in units of 0.1%.

Line Traffic Measurement

2.53 For each network loop a special set of lines and/or trunks can be defined. In addition to the normal traffic measurements, additional peg and usage measurements are made for this set of terminals. Lines and/or trunks to be included in this set are given the ITM (Individual Traffic Measurement) class-of-service (COS) and may be defined to the system via the Traffic Control program. (Attendants may not be given the ITM COS.)

3.06 Loop Usage. The loop usage of a particular loop gives the total time that the time slots of the loop have been marked as busy and unavailable for other use.

3.07 Loop FTM. The loop FTM is incremented when:

(a) A terminal to terminal connection is blocked. In this case the loop FTM of both network loops is incremented.

(b) A terminal or DTR to service loop path is blocked. An FTM will accumulate on both the service loop and the terminal loop. For any one call, at most one pair of FTM due to failure to find a tone path and/or one pair of FTM due to failure to find an outpulsing path can occur.

(c) A 2500-type set to DTR path is blocked. An FTM will accumulate on both the DTR loop and the terminal loop. For any one call, at most one pair of FTM per blocked idle DTR can occur. After the first pass at all DTRs, further attempts to find an idle DTR and a path to it (the system tries again automatically) will not accumulate further loop FTM.

(d) A terminal loop to conference loop connection is blocked when either trying to form a new conference or to add a new conferee to an existing conference.

3.08 Intraloop Peg Count. If a path is eligible for Loop Peg Count and both terminals are on the same network loop, then the Loop Peg count is incremented twice, once for each terminal, and the Intraloop Peg Count is incremented once.

3.09 Intra-loop Usage. If the path is between two connection points on the same loop, then the usage for the call is added twice to Loop Usage (each connection point occupied one time slot and therefore two time slots were busy on the loop) and once to the Intraloop Usage.

3.10 Intraloop FTM. When a path is eligible to accumulate Loop FTM and both terminals are on the same loop, then loop FTM is incremented twice (once for each terminal) and Intraloop FTM once.

Service Loops

3.11 Loop Peg Count. The count is incremented whenever a path to the loop is made idle.

3.12 Loop Usage. Loop usage gives the total time that time slots of this loop have been marked busy and unavailable for other use.

3.13 Loop FTM. When a path (for either a tone or outpulsing) is required between a terminal loop and service loop then, in general (maintenance routines are one exception), all service loops (of the appropriate type) in the system will be looked at to see if a path is available. If no path can be found to any service loop, then Loop FTM is incremented on the LAST service loop looked at. If a path is found, then no Loop FTM is accumulated for any loop. Within a given network group, service loops are looked at in a fixed order. Normally, one service loop, the first choice, accumulates most of the peg and usage traffic, whilst another service loop, the last choice, accumulates all of the Loop FTM measurements. When repeated attempts are made by the system to find a path to provide a service (e.g., dial tone) then any attempt after the first does not accumulate further Loop FTM.

Table 3-A
TFS001 NETWORKS - FORMAT AND EXAMPLE

FORMAT:

System ID TFS001

Loop Number	Loop Type	Intra FTM	Intra CCS	Intra PC	Loop FTM	Loop CCS	Loop PC

EXAMPLE:

200 TFS001

00	TERM	00000	0000006	00004	00000	0000064	00056
01	TERM	00000	0000035	00022	00000	0000123	00086
02	TERM	00000	0000031	00020	00000	0000126	00075
05	CONF	00000	0000000	00000	00000	0000000	00000
07	TDS	00000	0000000	00000	00000	0000000	00000
08	TERM	00000	0000019	00011	00000	0000143	00098
09	TERM	00001	0000089	00066	00002	0000194	00149
13	TERM	00000	0000000	00000	00000	0000025	00006
15	TDS	00000	0000000	00000	00000	0000031	01496

Note: In Generic X11, the loop number is expressed as a 3-digit number.

TFS002 SERVICES

3.20 TFS002 gives three categories of service measurements. The meaning of the measurements differs according to the type of service. The following measurements are provided for all services except Digitone receivers and Conference loops:

(a) **Service Request Peg Count.** This measurement is incremented whenever a path between a terminal and a service loop is idled. The service provided (tone, outpulser or mf tones) defines which service request peg count to be incremented. An outpulser is held busy for the duration of outpulsing. This measurement, therefore, increments once per outgoing (or tandem) call that at least starts to outpulse digits. If it cannot be determined which service was being provided by a TDS loop then miscellaneous tone is assumed and the miscellaneous tone service peg count is incremented.

(b) **Service Usage.** This gives the time that the path to the service loop was busy. This is not necessarily the same time as the time during which the service was actually applied, as certain paths (e.g., outpulsing) are reserved before they are to be used and only idled when it is certain that they are no longer required.

(c) **Service FTM.** When no path can be found between a terminal and any service loop then the appropriate Service FTM, according to the path's purpose, is incremented. When repeated attempts are made by the system to obtain a path for a service (i.e., dial tone, overflow tone or outpulser) then any attempts after the first will not accumulate further Service FTMs.

09 for Conference

10 for MF tone for ANI

11 for SL-1 Tone Detector.

3.29 Dial tone, busy tone, overflow tone, ringback tone, tone ring and Digitone receiver all peg once per connection to the service. Outpulsers peg once each time they are used in a normal outgoing call. Miscellaneous tone includes override, busy verification, etc. When an attempt to find a network path between a terminal and a service loop results in a failure to match:

(a) Requests for Digitone receivers, dial tone, overflow tone and outpulsers connections are placed in queues and periodic attempts to find a network path are made.

(b) Requests for tones other than dial tone and overflow tone are abandoned.

(c) Conference connections are replaced by overflow tone. The console tone and the SL-1 buzzing tone are not provided by the tone and digit switch.

Table 3-C
TFS003 DIAL TONE DELAY - FORMAT AND EXAMPLE

FORMAT:

System ID TFS003

Delay >3 s	Delay >10 s	Total Delays > or = 1 s

EXAMPLE:

200 TFS003

00003	00001	0040

TFS004 PROCESSOR LOAD

3.31 The Processor Load output (Table 3-D) gives peg counts for idle cycle count, total CPU attempts, load peak peg, input/output buffer overflow and call register overflow.

3.32 **Idle Cycle Count.** The idle cycle count gives an indication of the load on the CPU. As the load increases, the idle cycle count decreases and vice-versa. This count is incremented every time the processor does not have any of the following tasks to perform:

- Input messages (including timing marks)
- 128 ms timing tasks (high-priority or low-priority)
- Ring/queue activity
- TTY input

3.33 **Total CPU Call Attempts.** This is incremented once for each of:

- Dial tone request
- Incoming trunk seizure
- Attendant origination to initiate a call
- Each attempt the attendant makes to extend a call.

3.34 **Load Peak Peg.** This is a count of the number of times that, within a 128 ms period, the processor does not have time to complete all the necessary 128 ms timing tasks (or tasks of a higher priority than the 128 ms timing).

Note: The factor 2500 is derived by derating the number of seconds in one hour (3600) such that there is 91% real time occupancy at 1.3 times the Average Busy Season Busy Hour (ABSBH) traffic, to provide the High Day Grade of Service (i.e., 20% of calls experience dial tone delay greater than 3 s).

Table 3-D
TFS004 PROCESSOR LOAD - FORMAT AND EXAMPLE

FORMAT:

System ID TFS004

(Idle Cycle Count) (CPU Attempts) (Load Peak Peg)
(HPIB Overflow Peg) (LPIB Overflow Peg)
(500/2500 OB Overflow Peg) (SL-1 OB Overflow Peg)
(CR Overflow Peg)

EXAMPLE:

200 TFS004

1474233	00446	00001
00000	00000	
00000	00000	
00000		

TFS005 LINES

3.40 These measurements (Table 3-E) are associated with a given set of terminals (not including attendants) on each loop. These are the terminals that are assigned the ITM COS. Usage and peg count measurements are accumulated for any one group of lines and/or trunks per terminal loop. The measurements include all the counts that are pegged in TFC001.

3.41 Line Peg Count. For terminals other than trunks. When an established path involving a terminal with ITM COS is idled, then Line Peg Count is incremented for the terminal's loop. If both terminals of an established path have ITM COS then two Line Peg Counts will accrue, one for each terminal. In addition, when an established path between a terminal and a conference is idled then, if that terminal has ITM COS, Line Peg Count is incremented for the terminal's loop.

3.42 For all trunk terminals the Line Peg Count is incremented when the trunk with ITM COS is idled if, at any time since the trunk was seized, it was involved in an established connection.

3.43 Line Usage. This is the total usage for all calls contributing to Line Peg Count.

3.46 Junctor Peg Count. The Junctor Peg Count is the total count for completed calls between network groups where a talking path has been established. Connections from tone and digit loops do not affect the peg count. The Junctor Peg Count is incremented whenever the path satisfies the conditions specified under TFS001, Loop Peg Count.

3.47 Junctor Usage. When any path between two connection points on different network groups is idled, the usage of that path is accumulated in Junctor Usage. This measurement, therefore, gives the total time that time slots of the junctor group were busy and unavailable for other use.

3.48 Junctor FTM. The Junctor FTM is the count of a failure to match while attempting to set up a connection between network groups. The Junctor FTM is incremented whenever a path is blocked and the conditions under TFS001, Loop FTM, are satisfied.

3.49 One line of output containing the junctor number, junctor failure to match, junctor usage and junctor peg count is given for each junctor group.

Table 3-F
TFS007 JUNCTORS - FORMAT AND EXAMPLE

FORMAT:

System ID TFS007

Junctor Group	Junctor FTM	Junctor Usage	Junctor PC

EXAMPLE:

222 TFS007

01	00001	0002344	01667
02	00000	0002122	01322
12	00002	0001993	00922

4.12 Intracustomer FTM. Incremented when a path cannot be found between two terminals, neither of which is a trunk.

Tandem Calls

4.13 Tandem Peg Count. Incremented when an established connection between two terminals, both of which are trunks, is idled and both trunks are also to be idled. A tandem call does not increment either Incoming or Outgoing Peg Counts.

4.14 Tandem Usage. When an established path between two terminals, both of which are trunks, is idled then tandem usage is accumulated.

4.15 Tandem FTM. When a path between two terminals, both of which are trunks, cannot be found due to network blocking, then Tandem FTM is incremented. Two attempts are made to find a path between the originating trunk and an idle outgoing trunk. If both attempts fail, one tandem FTM is pegged.

Ineffective Attempts

4.16 Partial Dial. Incremented for 2500-type sets only when dialing is not completed within 30 s.

4.17 Abandon. Incremented when a terminal, other than a trunk, goes on-hook and thus abandons a call before having dialed a complete directory number or a trunk access code. This count will not increment if a partial number has been outpulsed on a trunk route.

4.18 Permanent Signal. Incremented when:

- a terminal does not start dialing within 30 s of receiving dial tone
- a terminal, other than a trunk or attendant, does not continue dialing once it has started and is placed into the line-lockout condition.

Table 4-A
TFC001 NETWORKS - FORMAT AND EXAMPLE

FORMAT:

System ID TFC001

Customer Number

Incoming FTM	Incoming CCS	Incoming PC
Outgoing FTM	Outgoing CCS	Outgoing PC
Intra-Customer FTM	Intra-Customer CCS	Intra-Customer PC
Tandem FTM	Tandem CCS	Tandem PC
Permanent Signal	Abandon	Partial Dial

EXAMPLE:

200 TFC001

00

00000	0000092	00072
00000	0000114	00074
00000	0000063	00083
00000	0000005	00003
00001	00016	00000

Note: In Generic X11, the customer number is expressed as a 3-digit number.

TFC002 TRUNKS

4.19 An output (Table 4-B) is given for each trunk group of each customer. The data includes peg count, usage, overflow, all trunks busy and toll peg count. The trunk type may be:

- Watts lines (WATT)
- Foreign Exchange (FEX)
- Common Control Switch Arrangement (CCSA)
- Direct Inward Dialing (DID)
- Central Office (CO)
- TIE trunks (TIE)
- Paging (PAGE)
- Dictation (DICT)
- Recorded Announcement (RAN)
- Automatic Identification of Outgoing Dialing (AIOD)
- Centralized Automatic Message Accounting (CAMA).

Trunk Status

4.20 Trunks Equipped. This is the number of trunks configured in the route at the current time.

4.21 Trunks Working. This is the number of trunks enabled in the route at the current time.

4.22 All Trunks Busy. Only valid for trunk groups with more than one equipped member. Incremented whenever the last enabled trunk of the group is made busy.

Incoming Trunks

4.23 Incoming Trunk Peg Count. If a path is eligible to be included in TFC001, Incoming Peg Count, then the Incoming Trunk Peg Count for the appropriate trunk group is also incremented.

4.24 Incoming Trunk Usage. If a path is eligible to be included in TFC001, Incoming Usage, then the usage is also added to Incoming Trunk Usage for the appropriate trunk group.

Outgoing Trunks

4.25 Outgoing Trunk Peg Count. If a path is eligible to be included in TFC001, Outgoing Peg Count, then Outgoing Trunk Usage is also incremented for the appropriate trunk group.

4.26 Outgoing Trunk Usage. If a path is eligible to be included in TFC001, Outgoing Usage, then the usage is also added to Outgoing Trunk Usage for the appropriate trunk group.

4.27 Outgoing Trunk Overflow. Incremented when a request for a trunk on this group fails, there being no idle, enabled trunk available. The overflow is counted even though the request may continue through (e.g., the ARS feature) to search other routes for an idle trunk. If a trunk is idle and enabled, but completion to that trunk is not possible due to network blocking, then Outgoing Trunk Overflow is not incremented.

> **Note 1:** Outgoing trunk connections are not considered complete until the End-Of-Dialing (EOD) timer expires after the last digit is dialed (normally 13 s). This means that connections of less than the EOD timer will not accumulate traffic data as complete connections. End of dialing may be forced by dialing an octothorpe (#). In this case the EOD timer is superceded.
>
> **Note 2:** If an outgoing trunk call is disconnected before the EOD timer expires, TFS001 usage will be accumulated. TFS001 peg count, TFC001 and TFC002 will not be incremented.

Toll Peg Count

4.28 Only valid for CO and FEX routes. Incremented when the first meaningful digit dialed after the access code is either a '0' or a '1'. A meaningful digit is one that is not absorbed by either the SL-1 or by the connecting central office. The measurement is incremented as soon as the first meaningful digit is dialed. Even if it is abandoned directly after the first meaningful digit, the Toll Peg Count will still have been accrued. It is possible, therefore, to get Toll Peg Count in excess of the number of completed outgoing calls.

4.32 Average Speed of Answer (ASA). This is the time that a call waits after its request to terminate at an attendant is recognised by the system and before it is answered. It is calculated by the following formula:

ASA = [(calls delayed × average time in queue)/total calls] + average attendant response.

Note 1: The percentage of the total calls that have to enter the attendant queue are not recorded. Therefore, no correlation between Average Speed of Answer, Average Attendant Response and Average Time in Queue can be made.

Note 2: Total calls include all incoming calls, dial '0', and recalls.

Example:

Customer 3, 4th. of October, 9:00
Peg Count in queue = 2
Average time in queue = 3 s
Average attendant response = 2.4 s
Total calls = 9

ASA = (2×3)/9 + 2.4 = 3.1 s.

4.33 Peg Count of Calls Delayed. Incremented whenever a call is removed from the attendant queue. If a call is removed from the queue and is presented but then is replaced into the queue because a second call has been selected via an ICI, this measurement is only incremented once as if the first call had remained in the queue throughout. Abandoned calls do not increment this count, whether they abandon while in the queue or after they are presented.

4.34 Peg Count of Abandoned Calls. Incremented whenever a call abandons before being answered by the attendant.

4.35 Average Waiting Time of Abandoned Calls. The average time that a call counted in Peg Count of Abandoned Calls waited before abandoning.

Note: For systems equipped with the Centralized Attendant Service (CAS) remote feature (Generic X05 and later), TFC003 measurements are also kept for RLT. The measurements for the local attendant(s) at the remote location and the RLT are combined in TFC003. (The CAS feature is described in 553-2681-100.)

4.41 Total Time Spent Servicing Calls. Total Time Spent Servicing Internal Requests plus Total Time Spent Servicing External Requests with perhaps an error of plus or minus 2 CCS, because of rounding in the CPU.

4.42 Total Time Console is Manned. The total time that the console was neither in Night Service nor Position Busy. Although a console is in Night Service or Position Busy, a call at present on the console can still be completed and, therefore, accumulate time. Also, new calls can still be originated by the attendant from the console. It is therefore possible to have a Total Time Spent Servicing Calls Greater than Total Time Console is Manned.

4.43 Number of Times All Attendant Loops are Busy. Incremented whenever the last attendant loop on the console is made busy.

4.44 One output is provided for each attendant. Data includes peg count and work time. 'Total time' measurements are expressed in CCS. Internal calls include those originated by the attendant.

4.45 The total time spent servicing calls may not exactly equal the sum of the total times spent servicing internal and external requests due to rounding (e.g., 1.3 and 1.4 both round down to 1, but their sum, 2.7, rounds up to 3). The total time a console is manned equals the total time the console is NOT in Night service and is NOT Position Busy. A position busy console may make outgoing calls and complete any incoming call presented to the console before the console was made position busy.

Table 4-E
TFC005 FEATURES - FORMAT AND EXAMPLE

FORMAT:

System ID TFC005

Customer Number

(Feature Number) (Peg Count)

EXAMPLE:

200 TFC005

00

00	00012
01	00002
02	00003
03	00015
04	00002
05	00000

etc.

Note: In Generic X11, the customer number and feature number are expressed as 3-digit numbers.

Table 4-F
TFC005 FEATURE KEY NUMBERS

NUMBER	FEATURE	NUMBER	FEATURE
00	Auto Dial	17	Call Selection (ICI)
01	Call Forward	18	Attendant Recall
02	Call Pickup	19	Dial Intercom
03	Call Transfer	19	Message Center INCALLS (X07)
04	Call Waiting	20	SL-1 Set Message Waiting
05	3-Party Conference	20	Attendant Message Indication (X07)
06	6-Party Conference	21	SL-1 Set Message Indication (X07)
07	Manual Signaling	21	Message Indication
08	Override	22	SL-1 Set Message Waiting (X07)
09	Privacy Release	22	Message Cancellation
10	Private Line Service	23	Message Center INCALLS
11	Ring Again	24	Attendant Overflow
12	Speed Call	25	Group Call
13	Voice Call	26	Auto Answerback
14	Volume Control	27	spare
15	Busy Verify	28	spare
16	Barge In	29	Call Park
		30	Stored Number Redial

4.60 The output is a breakdown over ARSQ codes (0 to 3), over defined Routings (0 to 255) and over associated routes of a Routing for the ARS Total Terminations peg. There is no breakdown over individual traffic items.

4.61 Each line of output is identified by a mnemonic: QC for ARSQ code, SB for Routing and RT for a route of a Routing. The ordering of the output is all ARSQ codes scheduled for printing followed by all Routings sheduled for printing. Each Routing is followed by the route breakdown for the ARS Total Termination peg.

4.66 Average Wait Time of System Park Number. This is the average time that calls wait on system park numbers. The time includes calls that are abandoned, pickup up by the paged party or released by the attendant on recall. The value is expressed in units of 0.1 s.

Table 4-H
TFC007 SYSTEM PARK - FORMAT AND EXAMPLE

FORMAT:

System ID TFC007

Customer Number

(Usage Count) (Overflow PC) (Recall PC) (Avg. Wait Time)

EXAMPLE:

200 TFC007

00

00002 00009 00003 00157

TFC007 CALL PARK
(Generic X11, X37)

4.67 Traffic measurement data is accumulated for the following items related to usage of the Call Park feature (Table 4-I).

4.68 System Park Usage. This count identifies the number of calls that were parked to a System Park DN.

4.69 Station Park Usage. This count identifies the number of calls that were parked to a Station Park DN.

4.70 System Park Overflow. This count identifies the number of calls that could not be parked because a System Park DN was not available.

4.71 Parked Access. This count identifies the number of parked calls that were successfully accessed.

4.72 Park Recall. This count identifies the number of parked calls that were recalled after the Call Park Recall Timer (service changeable) expired.

4.73 Average Wait for Access. This value (expressed in units of 0.1 s) reflects the average time that parked calls waited before being accessed.

Table 4-J
TFC008 IMS/IVMS - FORMAT

System ID TFC008

Customer Number

APL

APL#	OUTQ OVFL	INPQ OVFL	AVGOQ SIZE	AVGIQ SIZE	DOWN TIME	OCR UAV	ICR UAV	TO	NAK	CHAR UNSYNC

OMSG	MSG0	MSG1	...	MSG9
	MSG10	MSG11	...	MSG19
IMSG	MSG0	MSG1	...	MSG9
	MSG10	MSG11	...	MSG19

PACKET XXXXX

MAQ ACD-DN	QLNGTH	MADRCT	MAINDRT	ABNDN	ABNDN AVG WAIT	AVG DLY	DCP	PCP

TST ACD-DN	TOTAL CALLS	SPRE	CFW	UST	FAIL

TMG ACD-DN	QLNGTH	TOTAL CALLS	SUCC	ABNDN	FAIL	AVG TIME	MARQST

where,

(a) APL

APL#	=	the number of the APL
OUTQ OVFL	=	output queue overflow
INPQ OVFL	=	input queue overflow
AVFOQ SIZE	=	average output queue size
AVGIQ SIZE	=	average input queue size
DOWN TIME	=	total APL down time in seconds
OCR UAV	=	output message call register unavailable
ICR UAV	=	input message call register unavailable
TO	=	total timeout count
NAK	=	total number of negative acknowledgements

Table 4-J Continued
TFC008 IMS/IVMS - FORMAT

QLNGTH	=	total number of calls queued for the message attendant
TOTAL CALLS	=	total number of Telset messaging calls
SUCC	=	total number of successful Telset messaging calls
ABNDN	=	total number of abandoned Telset messaging calls
FAIL	=	total number of unsuccessful Telset messaging calls
AVG TIME	=	average Telset messaging processing time in seconds
MARQST	=	total number of Telset messaging calls that requested the message attendant.

Note 3: If the New Flexible Code Restriction (NFCR) feature is equipped in conjunction with either BARS or CDP, the number of available NCOS groups is 8 (0 to 7). If the AUTOVON feature is equipped with BARS or CDP, 16 (0 to 15) NCOS groups are available.

5.03 The routing traffic measurements (TFN001) provide data related to route list utilization. The measurements show how often a route list was accessed, which entries in the list were used and whether the call was successful in completing a selection or connection. Routing traffic measurements are available at SL-1 Node and SL-1 Main switches.

5.04 Routing traffic measurements (Table 5-B) are provided for each defined route list at an SL-1 switch.

5.05 Route List Requests. This measurement identifies the total number of attempts (calls) in which the called destination translations identified this route list to attempt call completion. The count is incremented each time the route list is selected to attempt route selection.

5.06 Route List Requests Served Without Delay. This measurement identifies the number of calls which were routed without encountering blockage or queuing. The count is incremented when a route list is selected and an available trunk is chosen without being offered Off-Hook Queuing (OHQ) or Call-Back Queuing (CBQ). The count includes expensive route acceptances.

5.07 Expensive Route Acceptances. This measurement identifies the number of times calls were routed over an expensive route choice after the caller was informed of the additional cost of the call. The count is incremented after a caller receives Expensive Route Warning Tone (ERWT) and elects to complete the call over the expensive facility.

5.08 Route List Requests Standard Blocking. This measurement identifies the number of call attempts that could not be served because a route or queuing process was not available to the caller. The blocked call may have been given overflow tone or recorded announcement, or routed to the attendant. The count is incremented if:

- the caller's Facility Restriction Level (FRL) is not sufficient to select any route choice
- no route choice is available and the caller is only allowed OHQ but too many calls are already queued
- the call times out in the OHQ
- blocking occurred and the system could not select another route choice and neither OHQ nor CBQ is allowed.

5.09 Route List Entry Usage Count. This measurement identifies the number of calls that were successfully routed over a particular route list entry (trunk route). A count is maintained for each route list entry. The count is incremented when:

- an entry is selected without being offered OHQ or CBQ
- an entry is selected after OHQ or OHQ timeout

5.18 Quantity of CBQ Offerings. This measurement identifies the number of CBQ calls that were offered CBQ callbacks regardless of whether the CBQ callback was answered. The count is incremented when the caller is presented with the CBQ callback.

5.19 Quantity of CBQ User Cancellations. This measurement identifies the number of CBQ calls that were removed from the CBQ at the user's request. The count is incremented when:

- a local station (500/2500-type set) dials the Ring Again cancellation code
- a local station (SL-1 set) depresses the Ring Again feature key when the associated lamp is steadily lit.

Note: Only those calls actually found in the CBQ and removed are counted.

5.20 With Generic X11 Release 3, traffic measurements for the SL-1 Tone Detector (SL1TD) are included in the TFN001 message. The peg is incremented when a trunk is seized but released when alternate routing is performed during a call involving an SL1TD.

TFN002 NETWORK CLASS-OF-SERVICE MEASUREMENTS

5.21 Traffic measurements are collected for each defined NCOS group (0 to 15) to indicate the grade of service, in terms of blocking and queuing delay, being provided by the system. If a grade of service is determined by the communications manager to be appropriate for users in a particular NCOS group, then the communications manager can either reassign the users to another NCOS group, redefine the characteristics of the existing NCOS group or change the routing parameters (see Table 5-C).

5.22 Quantity of Calls Received. This measurement identifies the total number of network call attempts generated by users assigned to this NCOS group.

5.23 Routing Requests Served Without Delay. This measurement identifies the number of call attempts that were routed without encountering blockage or being offered queuing.

5.24 Expensive Route Acceptances. If the NCOS group is defined to provide an Expensive Route Warning Tone (ERWT) to the call originator when an expensive route is selected for call completion, the count is incremented if the user allows the call to complete over the expensive facility after having received the ERWT.

5.25 Network Call Standard Blocking. This measurement identifies the number of call attempts, by users in this NCOS group, that could not be served because a route or queuing process was not available to the user.

5.26 Calls Refusing Expensive Routes. This measurement identifies the number of callers that received ERWT and either abandoned the call or activated the Ring Again feature to place the call in the Call-Back Queue.

5.27 Quantity of Calls Placed in OHQ. This measurement identifies the number of calls, generated by users in this NCOS group, that were offered Off-Hook Queuing (OHQ) and accepted the offer.

5.28 Average Time in OHQ. This measurement identifies the average duration that calls remained in the OHQ. The time is expressed in units of 0.1 s. (Calls which time out in the queue are included in the average.)

5.29 Quantity of CBQ calls. This measurements identifies the number of calls that were offered Call-Back Queuing (CBQ) and accepted (i.e., invoked Ring Again) the offer.

5.30 Average Time in CBQ. This measurement identifies the average time (in units of 0.1 s) that calls in this NCOS group waited in the CBQ for an available route. The measurement includes calls which requested a CBQ cancellation, calls which were completed and calls that initiated direct Ring Again against trunks.

5.34 Quantity of Incoming Calls Offered CCBQ or CBQCM. This measurement identifies the number of incoming trunk calls that were blocked at the SL-1 Node and the user was given the option of accepting an SL-1 Node initiated callback when facilities become available. The measurement relates to use of the CBQ feature by users at an SL-1 Main (Coordinated Call-Back Queuing) or Conventional Main (Call-Back Queuing for Conventional Mains).

5.35 Quantity of Calls Accepting CCBQ or CBQCM. This measurement identifies the number of incoming trunk calls that were blocked at the SL-1 Node, were offered CBQ and accepted the offer. The count relates to CBQ acceptances by users at an SL-1 Main or Conventional Main.

5.36 Average Time in CBQ. This measurement (expressed in units of 0.1 s) reflects the average time that users at an SL-1 Main or Conventional Main remained in the CBQ (at the SL-1 Node) for a facility to become available.

> **Note 1:** When a CCBQ callback is offered to a busy station at an SL-1 Main, the call is removed from the queue for 5 minutes then reinserted in the queue. This process occurs only once. The additional queuing time is added to the average time. The 5 minute suspension time is not included in the average time, nor is reinsertion into the queue pegged as another CBQ call.
>
> **Note 2:** When a CBQCM callback is offered to a station at a Conventional Main that is busy or fails to answer the callback, the call is removed from the queue and reinserted into the queue as specified in Note 1.

5.37 Quantity of Calls Blocked in Callback. This measurement identifies the number of CBQ callbacks (CCBQ or CBQCM) initiated by the SL-1 Node that could not be completed because an outgoing trunk group (to the SL-1 Main or Conventional Main) was not available.

5.38 Callback Attempts No Answer and Cancellation. This measurement identifies the number of callback attempts that were not successful because the caller failed to answer the callback. CBQ callbacks to a station at an SL-1 Main that has previously cancelled CBQ are treated as callback attempts no answer.

Table 5-D
TFN003 INCOMING TRUNK GROUP - FORMAT

System ID TFN003

Customer Number

TRKG xxx
OHQ aaaaa bbbbb
CBQ ccccc ddddd eeeee fffff ggggg

where,

a = quantity of calls placed in OHQ

b = average time in OHQ (in units of 0.1 s)

c = quantity of incoming calls offered CBQ (CCBQ or CBQCM)

d = quantity of calls accepting CBQ offer (CCBQ or CBQCM)

e = average time in CBQ (in units of 0.1 s)

f = quantity of blocked CBQ callbacks (CCBQ or CBQCM)

g = quantity of callback attempts not answered or cancelled

x = incoming trunk group number (0 to 127)

TFN101 OHQ OVERFLOW THRESHOLD

5.39 The Off-Hook Queue (OHQ) overflow threshold measurement provides an indication that more than the expected number of users are timing out in the OHQ. This means that OHQ is offered and accepted but a trunk does not become available before the service-changeable OHQ time limit expires. This could result from trunks being out of service, an incorrectly defined OHQ time limit or temporary traffic overload.

5.40 OHQ Overflow Threshold Format.

System ID TFN101
Customer Number

OHQT aaaaa bbbbb

where,

aaaaa = the number of OHQ calls which timed out (overflowed) in the OHQ before an available trunk was found.

bbbbb = the threshold. This value (expressed in units of 0.1 percent) represents the total number of OHQ overflow, divided by the total number of OHQ offers plus the OHQ overflows.

(Junctor Group) (Junctor Usage) (Threshold)

6.10 Example.

222 TFS105

13 0002341 0002000

TFC101 INCOMING MATCHING LOSS

6.11 This is a threshold level set on the percentage of incoming calls where a failure to match occurs while attempting to set up a connection between an incoming trunk and a called line or the attendant, or the attendant fails to extend the call due to a failure to match. It is expressed in units of 0.1%. Also output when a threshold violation occurs is TFS001, Networks.

> Note: When an incoming call is not presented to an attendant due to a failure to match, it is included in the Incoming Matching Loss (IML) figure but it is not necessarily lost. The call is placed in the attendant queue and regular attempts are made to present it to an attendant when the network permits. A call contributes at most one failure to match count to the IML measurement regardless of further failures to complete due to failures to match.

6.12 Incoming Matching Loss Threshold Format.

System ID TFC101

Customer Number

(Incoming Matching Loss) (Threshold)

6.13 Example.

200 TFC101

00

00014 00010

TFC102 OUTGOING MATCHING LOSS

6.14 This is a threshold level set on the percentage of outgoing calls where a failure to match occurs while attempting to set up a connection between a line equipment and an outgoing trunk. It is expressed in units of 0.1%. Also output when a threshold violation occurs is TFS001, Networks. Each outgoing call can be pegged only once for outgoing matching loss.

6.15 Outgoing Matching Loss Threshold Format.

System ID TFC102

Customer Number

(Outgoing Matching Loss) (Threshold)

6.16 Example.

200 TFC102

02

00014 00010

TFC103 AVERAGE SPEED OF ANSWER

6.17 This is a threshold level set on the average time, in units of 0.1 s, that calls wait to be answered by the attendant. Also output when a threshold violation occurs are TFC003, Queue, and TFC004, Console.

6.18 Speed of Answer Threshold Format.

System ID TFC103

Customer Number

(Average Speed of Answer) (Threshold)

6.19 Example.

200 TFC103

00

00152 00120

TFC104 PERCENT ALL TRUNKS BUSY

6.20 This is a threshold level set on the percentage of trunk connections where the last trunk in a trunk group is made busy. It is expressed in units of 0.1%. The All Trunks Busy measurement is only made for trunk groups that have more than one member. The equation for calculating this threshold is:

All Trunks Busy Peg Count/(Successful Calls + Overflows)

> **Note:** Successful calls are defined as those that have been answered or reached the established state. All calls except outgoing trunk calls are considered successful as soon as they are answered. Outgoing trunk calls are considered successful only when the End-Of-Dialing (EOD) timer has expired or an octothorpe (#) has been dialed to force an end of dialing.

6.21 Percent All Trunks Busy Threshold Format.

System ID TFC104

Customer Number

Trunk Group

(All Trunks Busy) (Threshold)

6.22 Example.

200 TFC104

02

04

00024 00017

(c) A period (.) prompt indicates that the system is ready to receive a new command from the teletypewriter.

(d) A double dash (--) prompt is output after an S or C command and indicates that the system is now ready to receive data.

(e) An asterisk (*) in the command definition indicates that the carriage return should be depressed.

(f) In this practice, the commands input by the user are written in upper case and the system responses are written in lower case.

(g) Table 8-C gives a listing of error messages that can be output while using the Traffic Control program.

Abbreviations

8.05 The following abbreviations are used to define the various data fields within a traffic measurement command.

sh = start hour
eh = end hour
sd = start day
ed = end day
sm = start month
em = end month
so = schedule options
tc = threshold codes
tv = threshold values.

TRAFFIC MEASUREMENT SCHEDULES

8.06 Traffic measurement schedules can be set independently for system and customer measurements. The schedule options are:

0 - No traffic scheduled

1 - Hourly, on the hour

2 - Hourly, on the half-hour

3 - Half-hourly, on the hour and half-hour.

8.07 A schedule period runs from the start hour of the start day to the end hour of the end day, only on the days of the week specified.

8.08 The start day, the start month, the end day and the end month are numerical representations of the date. For example, August 17 is entered as 17 8. The days of the week are specified as follows:

1 = Sunday

2 = Monday

3 = Tuesday

4 = Wednesday

5 = Thursday

6 = Friday

- TFS001, the sum of loop peg over all conference loops should equal TFS002, service peg - conference only.

Note: To clear the schedule enter 0.

Example:

```
.SSHC 0 16 7 14 5 -- 1 6 12 6
12 21 3 -- 0 23 3
2 3 4 5 6 -- 1
.
```

TRAFFIC MEASUREMENT OPTIONS

8.14 System Measurement Options. The system measurement options are:

Option 1 - Networks (per loop)

Option 2 - Services

Option 3 - Dial Tone Delay

Option 4 - Processor Load

Option 5 - Lines

Option 7 - Junctor Group Traffic.

8.15 Customer Measurement Options. The customer measurement options are:

Option 1 - Networks (per customer)

Option 2 - Trunks

Option 3 - Queue

Option 4 - Attendant Console

Option 5 - Features

Option 6 - ARSQ/RGA (not applicable in X11)

Option 8 - Integrated Messaging System and Integrated Voice Messaging System.

Note: If no options are currently set, NIL is output by the system. If option 5 is to be set for a customer then the customer must be defined via command SCFT.

8.16 Network Measurement Options. The network measurement options (set on a customer basis) are:

Option 1 - Route List Measurements

Option 2 - Network Class-of-Service Measurements

Option 3 - Incoming Trunk Group Measurements.

8.17 Query System Traffic Measurement Options. The format of this command is:

SOPN (CUSTOMER) (options) -- (OPTIONS)

Example:

.SOPN 0 2 -- 1
.

8.24 Query Customer Network Traffic Options. Use the following command to query the network traffic options:

TOPN (CUSTOMER) (options)

Example:

.TOPN 0 1 2
.

8.25 Clear Customer Network Traffic Options. Use this command to clear the network traffic options:

COPN (CUSTOMER) (options) -- (OPTIONS)

Example:

.COPN 0 1 2 -- 1
.

RESHOLDS

8.26 Threshold levels can be queried or set for the system or for each customer. The system thresholds with their respective codes and ranges of values are given in Table 8-A. The customer thresholds with their respective codes and ranges of values are given in Table 8-B.

le 8-A
STEM THRESHOLDS

CODE	MEASUREMENT	RANGE
1	Dial Tone Speed	00.0% to 99.9%
2	Loop Traffic	000 to 999 CCS
3	Junctor Group Traffic	0000 to 9999 CCS

SOPN (CUSTOMER) (options) -- (OPTIONS)

Example:

.SOPN 0 2 -- 1
.

8.24 Query Customer Network Traffic Options. Use the following command to query the network traffic options:

TOPN (CUSTOMER) (options)

Example:

.TOPN 0 1 2
.

8.25 Clear Customer Network Traffic Options. Use this command to clear the network traffic options:

COPN (CUSTOMER) (options) -- (OPTIONS)

Example:

.COPN 0 1 2 -- 1
.

THRESHOLDS

8.26 Threshold levels can be queried or set for the system or for each customer. The system thresholds with their respective codes and ranges of values are given in Table 8-A. The customer thresholds with their respective codes and ranges of values are given in Table 8-B.

Table 8-A
SYSTEM THRESHOLDS

CODE	MEASUREMENT	RANGE
1	Dial Tone Speed	00.0% to 99.9%
2	Loop Traffic	000 to 999 CCS
3	Junctor Group Traffic	0000 to 9999 CCS

LINE TRAFFIC TERMINALS

8.31 These commands are used to query and change the Individual Traffic Measurement (ITM) class-of-service for given Terminal Numbers (TN). SL-1, 500/2500-type or trunk terminals can have this class-of-service. Terminals with ITM set are included in the groups for which Line Traffic Measurements ae recorded.

8.32 Query Line Traffic TN. The format for this command is:

TITM
(tn)
(tn)
(tn)
etc.

Note: If only the loop number is printed, it means that all equipped terminals have ITM set. If only the loop and shelf numbers only are printed, it means that all equipped terminals on the specified shelf have ITM set. If the loop, shelf and card numbers are printed, it means that all equipped terminals on the specified card have ITM set.

Example:

```
.TITM
SHELF 04 0
LOOP  05
TN    11 3 4 1
CARD  13 2 1
TN    15 1 2 0
```

8.33 Set Line Traffic TNs. The format for this command is:

SITM
(tn)
(tn)
(tn)
etc.
-- (TN)
-- (TN)
-- (TN)
-- *

Note 1: If only the loop number is entered and RETURN is depressed, it requests that all equipped TNs on the specified loop have ITM set.

Note 2: If only the loop and shelf numbers are entered and RETURN is depressed, it requests that all equipped TNs on the specified shelf have ITM set.

Note 3: If the loop, shelf and card numbers are entered and RETURN is depressed, it requests that all equipped TNs on the specified card have ITM set.

Note 4: If the loop, shelf, card and unit numbers are entered, it requests that the given terminal has ITM set.

Note 5: If ALL is entered, this sets ITM for all equipped TNs in the entire system.

Example:

.TDTA 0 12

.

8.39 Set System Time-Of-Day Adjustment.

SDTA (adjustment) -- (ADJUSTMENT)

Example:

.SDTA 0 12 -- 1 142

.

ACCESSING DATA IN HOLDING REGISTERS

8.40 Data held in the holding registers can be output immediately and/or tested against threshold values. The data is accumulated over the previous measurement period. Data in the accumulating registers is not accessible.

8.41 Both the system and the customer traffic measurement data can be printed immediately. The data is output from the holding registers and is that data which was collected the last time the relevant traffic was scheduled.

8.42 Invoke System Traffic Data. The following command is used to invoke the immediate printing of system traffic data:

INVS (OPTIONS)

Example:

.INVS 1 3

.

8.43 Invoke Customer Traffic Data. Use the following command to invoke immediate printing of customer traffic data:

INVC (CUSTOMER) (OPTIONS)

Example:

.INVC 0 1 3

.

8.44 Invoke Customer Network Traffic Data. Use the following command to invoke immediate printing of customer network traffic data:

INVN (CUSTOMER) (OPTIONS)

Example:

.INVN 0 2

.

8.45 The threshold tests are for the system and/or customer thresholds. When an invoked threshold test passes, OK is output.

8.46 Invoke System Threshold Tests. The command format is:

IDLE TITLES

8.53 The IDLT command is used to suppress the printing of the title (i.e., TFS000) and the date and time in cases where traffic measurement is scheduled but no other data is printed. There are two options:

0 - No title will be printed unless further data is also to be printed.

1 - The title will be printed whenever traffic measurement is scheduled even when no other data is to be automatically printed.

8.54 The default option is 1, i.e., the title is normally printed. The format of the command is:

IDLT (option)

Example:

.IDLT 0

ARS QUEUING

8.55 **Query ARSQ Code Options.** The command format is:

TACC (CUSTOMER) (options)

Example:

.TACC 2 0 2 3

8.56 **Set ARSQ Code Options.** The command format is:

SACC (CUSTOMER) (options) -- (OPTIONS)*

Example:

.SACC 2 0 2 3 -- 1

8.57 **Clear ARSQ Code Options.** The command format is:

CACC (CUSTOMER) (options) -- (OPTIONS)*

Example:

.CACC 2 0 2 3 -- 2 3

8.58 **Accessing data in ARSQ code holding registers.** The command format is:

IACC (CUSTOMER) -- (OPTIONS)*

Example:

.IACC 2 -- 0 1 2 3

Table 8-C
TRAFFIC MEASUREMENT ERROR MESSAGES

ERROR MESSAGE	INTERPRETATION
TFC200	Syntax. Illegal character has been input.
TFC201	The parameter specified is out of range.
TFC202	The loop specified is not equipped.
TFC203	The card specified is not equipped.
TFC204	The unit specified is not equipped.
TFC205	Program bug - should never happen.
TFC206	Customer specified is not equipped.
TFC207	Traffic Print program is busy with scheduled output.
TFC208	Traffic Control program cannot be invoked from an SL-1 maintenance set.
TFC209	ARST package unavailable.
TFC209	The Network Traffic (NTRF) feature is not equipped (Generic X11).
TFC210	ARS unequipped for customer.
TFC210	There is no ESN customer data block (Generic X11).
TFC211	Traffic block does not exist.
TFC211	There is no ESN Data for the requested item (Generic X11).
TFC212	The NCOS data block does not exist in the system (Generic X11).
TFC213	IMS package not equipped.
TFC213	Password does not have access to this customer data (Generic X08).
TFC214	Password does not have access to system commands (Generic X08).
TFN401	Routing control has been invoked from an attendant console; the time (hh mm ss) and termination number (TN) of the console are included in the message.

Table 8-C Continued
TRAFFIC MEASUREMENT ERROR MESSAGES

ERROR MESSAGE	INTERPRETATION
TFN402	Routing control has been deactivated from an attendant console; the time and TN of the console are included in the message.